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RURAL EXTENSIONS.

Steadily increasing prosperity among the farmers of our country is responsible for liberal purchases by them of equipment that makes for better living and working conditions on the farm. One of the lines in which money is being put into circulation is the purchase of electric lighting plants and miscellaneous electrical equipment. The growing use of such isolated country lighting plants is causing central stations to realize that unless they are enabled to put up rural lines to serve the farmers, the latter will put in their own plants and to that extent render future rural extensions less profitable by the restricted number of customers served.

The problem of financing rural extensions, although successfully solved in quite a few instances, has on the whole been a vexatious one. Many central stations have contended that the farmers must bear the entire cost of the extensions and their necessary equipment of transformers, lightning arresters, etc. A few companies have borne this entire cost themselves, this being true, however, only where both the number of customers served per mile of line and their average load was high. To anyone who has given the matter careful consideration it has become apparent that the distribution of the cost of extensions depends on the density of load. Above a certain density of load the central-station company can well afford to bear the entire cost of the extension. In these days of commission regulation, however, it was inevitable that the matter would have to be passed on sooner or later by one or more of the state utility commissions.

The Wisconsin Railroad Commission has just rendered a decision in a case of this kind. As reported in the department of Public Service Commissions in this issue, the commission has decided that the cost of the line construction, including poles, wires, insulators, etc., should be borne by the customers, since no other equitable way is open in view of the greatly variable length of the required extension. The cost of the transformer, lightning arrester, meter and other individual service equipment must be borne by the central station, since this is only somewhat greater than that necessary to serve urban customers and the increased investment is relatively standard for all the rural customers and can be taken care of by an adequate demand charge or sufficiently high monthly minimum bill. This rule has much to commend it. It is not only fair and equitable, but should serve to stimulate the farmers to co-operate more heartily with the central station.

By helping the latter to secure every farmer along the line as a customer, the amount that must be paid out by each farmer for the line extension is correspondingly reduced. It is to be hoped that the results of this practice in Wisconsin will bear out the expectations.

ELECTRICAL PROSPERITY WEEK.

On other pages of this issue there is published a comprehensive account of the plans of the Society for Electrical Development with respect to the holding of Electrical Prosperity Week, November 29 to December 4. In every part of the country enthusiasm is rampant, and we find every element of the electrical industry busily engaged in arranging for a record-breaking achievement in popularizing the utilization of electrical energy and electrical apparatus. Many of the larger central stations have thrown the entire weight of their organizations into the plan for the celebration of the week, and co-operating with manufacturers, jobbers, contractors and dealers, will expend a generous amount of money in bringing to the attention of the public the advantages of electrical service.

The staff of the Society had carried out in the most creditable manner the plans of the general committee under whose auspices the idea of Electrical Prosperity Week was inaugurated. Only those who have come into intimate contact with the central office of the Society can appreciate the tremendous amount of material which has been involved in the propaganda. It is confidently expected that so apparent will the message of usefulness be made during Electrical Prosperity Week that a great part of the resistance to entire conversion even upon the part of those to whom the least benefit might accrue, will be swept away. Another and very important effect of the celebration will be in the heartening of all those interested in the business. To many the matter of the manifold advantages of electrical service has become so familiar that the imagination is just a little bit jaded. To these Electrical Prosperity Week will speak a special message. Altogether it seems as if there might have been some element of foreordination in selecting the date for the celebration. Surely in the history of the country it does not appear as if there had been available a more favorable arrangement of circumstances for cashing in to the maximum extent upon a campaign of nation-wide publicity.

GROWTH OF THE ELECTRIC-VEHICLE BUSINESS.

When the utilization of electric vehicles is compared with the present application made of gasoline automobiles, it would seem that very little use has so far been made of the electric vehicle for either passenger or freight service.

The electric vehicle had its birth about the same time as the gasoline car. Its development, however, was not at the first nearly so rapid. In judging the growth of the electric-vehicle industry the more reasonable basis of comparison is with other electrical development, as was pointed out by Messrs. H. H. Holding and Stephen G. Thompson in a paper presented at the recent annual convention of the Electric Vehicle Association of America and reproduced in this issue. The authors of this paper have compared the consumption of electric energy by electric vehicles in a certain territory with the consumption of electrical energy for commercial power uses during the same period. The diagrams given in this article make the relative development very evident. The application of electricity for commercial power shows on the whole a constant and steady growth, three years having sufficed to increase the consumption about 2.6 times. During the same period the use of electric energy for driving vehicles has increased about four times, showing a development which, while not so steady, is proportionally greater in the aggregate.

It is also shown by the authors that the percentage increase in the use of electric vehicles in three years is greater than the percentage increase in the use of electric power drive in 10 years. These figures are a clear indication that the electric-vehicle industry is developing as rapidly as could have been expected, and that it only requires the recognition on the part of central-station men of the possibilities along this line, and the establishment of adequate charging facilities in their respective territories, to make the development one of even greater rapidity. In the midst of all the boosting for electrical things, which is being done in connection with Electrical Prosperity Week, the electric vehicle should not be forgotten.

ORGANIZING FOR CO-OPERATION.

Organization of each branch of the industry is a prerequisite to co-operation between the different branches. As this has become more and more realized, closer organization has been accomplished. Real results are beginning to be achieved. While contractors have had national and local organizations for some years, these have not always been so comprehensive as might be wished, nor has their work been always pushed with the vigor and confident enthusiasm which bring the desired results.

Attention has been focussed during the present year on the California Association of Electrical Contractors and Dealers on account of the practical and telling progress which is being accomplished in that state through organization and the use of association machinery in handling the problems which crop up in the relations between the contractor-dealers and the other branches of the industry, notably the jobbers and the central stations. As other organizations may wish to follow the lead of California in forming an instrument of government, the by-laws of the California association are printed in this issue.

THE UTILIZATION OF WATER POWER.

Statistics presented in a paper at the International Engineering Congress by Mr. Charles H. Mitchell showed that the United States is utilizing about one-quarter of the power available within its limits from falling water. In percentage of utilization we are surpassed by only two foreign countries, Switzerland and Germany. The latter shows a high percentage because its resources of this type are very scanty, the developed horsepower per capita being among the lowest of the countries considered. The actual horsepower already developed in this country is far greater than in any other, but the per-capita development is exceeded by Norway, Canada, Switzerland and Sweden. As none of the latter are thickly populated, the United States may fairly be said to lead the world in hydroelectric development. Its resources are larger, its developed power larger than any country which has been carefully surveyed, and its percentage of utilization is among the highest.

Evidence presented before the Senate Committee on Water Power last year showed that there is available in the United States, excluding Alaska, over 28,000,000 horsepower, of which about 7,000,000 horsepower has been developed. The percentage of development is higher in the East than in the West. A large part of the available power is located in the region west of the Rocky Mountains, and especially in the northern portion of that section. These states include vast areas of the public domain, control of which rests with the United States Government. Since access to public land is necessary for the development of the water power in many cases, control of the latter indirectly is in the hands of the Federal Government. Since the Federal Government has control of all navigable streams, available water power on such streams is also under the hand of the Government.

The future development of water power in this country awaits action by the Congress. A large proportion of the undeveloped water powers are under federal control, and use of them can only be undertaken under some general law or under special enabling acts. The latter form of dispensation has become unpopular. A general law permitting development at any suitable location under proper restrictions is now and has been for some years, urgently demanded. The need for such a law is well stated in a paper by Mr. Thomas W. Martin which was read at the recent convention of the Alabama Light and Traction Association, held at Montgomery, and is printed in this issue.

Development of water power can only come through government agencies or private persons. If private sources of capital are to be depended upon for development, conditions must be created which will make investment appear safe and likely to yield returns as great as are secured in other avenues of investment. Short or uncertain tenures of franchises or permits do not meet these conditions, nor does uncertainty as to the disposition of the property at the end of the tenure. If these two requirements are fairly met in federal legislation on the subject any safeguards which may be provided to protect public interest in the perpetual use of these natural resources will not prove unsurmountable obstacles to progress in the utilization of our "white coal."

SELECTING A VOCATION.

The ranks of successful electrical contractors probably display as great a variety of types of men, as judged by their preparation for the work, as any occupation that can be named. Some are electrical engineers, some have stepped up from former service as linemen or electrical workers, some have turned to this from some other business, and some have had their introduction to electrical work as an inspector or central-station employee. Out of the multitude of schools of all sorts in this broad country, few make a special point of preparing men for this work. They must prepare themselves for it, or be prepared by the previous experience which fortune leads them into.

Of the many qualities which are desirable in the man who takes up electrical contracting work, two are absolutely essential to success. One is a familiarity with the work to be done; the other is a knowledge of how to conduct a business. The contractor is not likely to essay a venture into the field unless he deems himself fitted in the first particular, yet many cases exist where an impartial critic might not agree with him. It is in the second particular, however, that a lack more frequently becomes evident. Electrical contracting is a business as well as a vocation, and business sagacity is quite as essential on the part of the contractor as is familiarity with the technical features of the work.

Many men do not discover their own abilities until late in life, with the result of selecting the wrong vocation. There has been many a mediocre professional man who might have been successful as a merchant or as a mechanic. Many undertake to do business who are better fitted to remain on a pay roll. Not a few men who as electricians or station engineers could be successful, attempt to carry on a contractor's or dealer's business which their natural aptitude and abilities prevent them from ever carrying to a sucessful conclusion.

Proficiency in business methods may often be acquired through study and experience by those who have talents in this direction. But men without these talents would better turn their energies in other directions where greater success will be their reward. Some are so constituted that their judgment in business matters is usually wrong, and the tedious detail of business routine is so objectionable to them that it is frequently neglected. Their best feeding ground lies in other pastures.

Conference on Valuation.

The Utilities Bureau has arranged for a conference on valuation, to be held at the Hotel Adelphia, in Philadelphia, Pa., on November 10, 11 and 12.

The first session will be held on Wednesday evening, November 10, at 8 o'clock, and will be devoted to the reproduction theory of valuation. The mayor of Philadelphia will preside, and an opening address made by Morris L. Cooke, acting director of the Utilities Bureau. Papers will be presented by John M. Eshleman, formerly president of the California Railroad Commission, on "Criticism of Reproduction Theory of Valuation," and by H. Findlay French on "Reproduction Value Versus Fair Value."

The session on Thursday morning will be devoted to "Original Cost." Addresses will be made by George W. Anderson, of Boston, on "Actual Cost as a Basis for Fair Value;" by Edward W. Bemis, of Chicago, on "Original Cost as the Chief Basis for Fair Value" and by Charles L. Pillsbury, engineer for the Public Utilities Commission of the District of Columbia, on "The Making and Maintenance of Priced Inventories."

The session on Thursday afternoon will be devoted to franchise values. Addresses will be made by John G. Morse, of Boston, on "Valuation by Approximation," and by D. F. Wilcox, of New York, on "Franchise Values."

At the session on Thursday evening land values will be discussed, the principal address being made by Hammond V. Hayes, of Boston.

The session on Friday morning will be devoted to depreciation. Addresses will be made by J. H. Goetz, of New York, on "Court Decisions on Depreciation," and by Halford Erickson, of the Wisconsin Railroad Commission, on "Depreciation as a Factor in Fair Value." The session on Friday afternoon will be devoted to "Going Value," the chief address being made by Clifford Thorne, of the Iowa Railroad Commission.

A subscription dinner will be held on Friday evening to close the conference. The discussion at this dinner will deal with the subject of "Valuation and the Future in Public Utilities." Addresses will be made by Charles A. Prouty, of the Interstate Commerce Commission, on "The Meaning of the Constitutional Protection in Valuation;" by William D. Kerr, of Chicago, on "Constitutional Protection in Valuation;" by John H. Gray, of the University of Minnesota, on "Opinion Testimony," and by M. R. Maltbie, of New York, on "Valuation and the Future in Public Utilities."

All the meetings, as well as the dinner, will be open to the public, and a number of prominent men have agreed to take part in the discussion following the principal addresses upon the various subjects mentioned. The headquarters of the Utilities Bureau is at 1009 Finance Building, Philadelphia.

Annual Meeting of Mechanical Engineers.

The annual meeting of the American Society of Mechanical Engineers is to be held in the Engineering Societies Building, New York City, on December 7 to 10, inclusive. The first session will be held Tuesday evening at which there will be an address by the retiring president, John A. Brashear, followed by a reception to the president-elect and other officers. On the following three days there will be nine business and technical sessions at which a large number of papers and reports will be presented and discussed. Among the papers of considerable electrical interest will be the following:

"Modern Electric Elevator and Elevator Problems," by David Lindquist. "Turbines vs. Engines in Units of Small Capacities," by J. S. Barstow. "The Connors Creek Plant of the Detroit Edison Company," by C. F. Hirshfeld. "Electric Operation and Automatic Electric Control for Machine Tools," by L. C. Brooks.

Among the social features arranged for is a smoker to be held on the evening of December 8, and the annual reunion, dinner and dance on the evening of December 9.

Columbus Jovians Hear of Experiences in War Zone.

The Jovian season at Columbus, O., was inaugurated on Friday, October 29, by a noonday luncheon at the Virginia Hotel with 60 members present. By prearrangement Dr. E. A. Hamilton, of Columbus, lately returned from Red Cross service at the front in Germany, was the speaker. He described the large use being made of the X-ray in military surgery, and gave other interesting facts regarding his experiences on the battlefields.

Through First Tribune Jaquith the Jovians have addressed a letter to the local Chamber of Commerce volunteering the co-operation of the 250 members of the Columbus chapter in the effort to induce Thomas A. Edison to stop off in that city on his homeward trip from San Francisco.

Gas-Producer Plants.

At the meeting of the American Society of Mechanical Engineers, to be held at the Engineering Societies Building, New York City, on the evening of November 9, a paper will be presented by C. M. Ripley entitled "Gas-Producer Power Plants in New York City and Vicinity."

Convention of Alabama Association.

The Alabama Light and Traction Association held a convention at the Gay-Teague Hotel, Montgomery, Ala., on October 20 and 21. The program included the following papers:

"Light Cars and One-Man Operation," by A. L. Kenyon.

"Merchandising Gas and Electricity," by Frank Hammond.

"The Relation of the Company to Its Employees," by J. T. Hury.

"The Relation of Accounts to Public-Utility Operation," by V. B. Day.

"High-Tension Outdoor Substations," by H. W. Young.

"Taxation of Public-Service Corporations," by T. K. Jackson.

"Gas-Meter Testing," by A. F Kersting.

"Water-Power Development in Alabama," by T. W. Martin.

The paper by T. W. Martin on "Water-Power Development in Alabama" is presented in full in this issue.

The following officers were elected:

President, F. H. Chamberlain, Alabama Power Company, Birmingham, Ala.

Vice-president, C. C. Henderson, Henderson Light & Power Company, Greenville, Ala.

Secretary and treasurer, J. P. Ross, Birmingham Railway, Light & Power Company, Birmingham, Ala.

Directors: T. K. Jackson, Mobile Electric Company, Mobile, Ala.; R. L. Ellis, Selma Lighting Company, Selma, Ala.; A. R. Smith, Demopolis Light & Power Company, Demopolis, Ala.; B. C. Adams, Montgomery Light & Water Power Company, Montgomery, Ala.; J. H. P. DeWindt, Birmingham Railway, Light & Power Company, Birmingham, Ala.

Apparatus for Transcontinental Telephony.

Some details of the equipment used in the experiments in radiotelephony between Arlington and San Francisco have been published in the London *Electrician*.

At the transmitter a bank of large bulbs very similar in construction to, and embodying the elements and circuits of, the de Forest oscillion was used. These were energized from a common generator, their circuits acting in unison on the common radiating antenna. Other auxiliary audion paths, which were in their turn voice-controlled from a master microphone, controlled this high-frequency energy as generated.

At the receiving station the de Forest audion detector and amplifier were used, connected so as first to amplify the high-frequency currents to approximately 100 times their original intensity, and then to transform these into low-frequency telephone currents.

ELECTRICAL PROSPERITY WEEK—ITS MISSION—AND HOW YOU CAN PROFIT

"Electrical Prosperity Week" commands the admiration of men who think and do things. It is a challenge to the pessimist. It is a warning to the drones and buzzards of life that the electrical era has nothing in stock for the man who consumes and never produces. It is a "gloom dispeller" of most impressive magnitude—nothing in industrial history ever measured its scope or equalled its response. It brings light not merely as illumination but floods the nation with understanding—compelling men and women to stop and to think.

In five years we saw your electrical business double, the investment going from a half billion to a billion, and then in the next five years, we saw it more than double again and the investment exceeded two billion dollars. Such figures bring a forcible realization that you are working in a field of constructive development, that cannot be matched in industry.—Frank A. Vanderlip, president, National City Bank, New York City.

In spite of what our greatest minds know of it, in spite of present day wonderful accomplishments, electricity, as Mr. Vanderlip indicates, is just in its infancy.

The infant prodigy has grown so rapidly that not many people realize how safely, clearly, efficiently and economically electricity can eliminate nearly all human toil.

For instance, how many people know that $80,000,000 was spent last year in spreading the doctrine of "Do It Electrically"? How many people know that the industry without counting electric railways, etc., represents investments of more than $3,000,000,000, enough to build seven Panama Canals or feed all the men and horses in the European war for eight years. Last year the industry did a business of $2,265,000,000. About $100,000,000 will be spent for Christmas gifts this year. Why shouldn't the electrical industry "cash in" on this big expenditure?

Day by day electricity is bettering life in all its complexities, reducing toil, raising men and women to the sphere of engineers compared with their previous destiny, making the world brighter, more joyous and a happier abode for mankind. Figures and popularity of electrical uses prove it.

Photograph by R. E. Mayhall.

Special Prosperity Sign and Illumination in Boston.

These are the thoughts "Electrical Prosperity Week" seeks to definitely impress on the face of the nation. It aims to make people see with the souls and minds as well as with the two eyes in their heads. It fixes a week of country-wide brilliancy during which a nation of 100,000,000 souls will have cause to ponder over what electricity is able to do for each. It has already achieved, as it well deserved, boundless support. It will be a week of electrical exhibitions, illuminations, demonstrations. It will prove that in the brief space of less than two generations electricity has come to be an indispensable help in our daily lives. Already 75 per cent of the nation's people come in contact with electricity in some form every day. Ten per cent make their living from electricity or its ramifications.

The celebration will be novel, unprecedented, unparalleled. It was instituted to create a stronger spirit of confidence in the stability of the nation and its resources, to show how much better the world has become since electricity became a factor of progress. It is a gigantic educational and sales campaign designed to promote better business and more sales of electricity and electrical products. The name "Electrical Prosperity Week" was given to the movement because electricity and prosperity go hand in hand.

The date was set for November 29 to December 4, because that time is really the beginning of the "Shop-early" Christmas campaign. If there were no other incentive, the fact that dealers and central stations can participate in a "shop-early" movement should induce electrical companies to co-operate for the success of the week.

The newspapers, magazines, motion-picture films have heralded the approaching of this big event throughout the country. The trade journals are telling the industry how they can benefit from the big week, also regarding its progress. The Society for Electrical Development is sending out to members, non-members, electric leagues, chambers of commerce, department stores, specialty shops, and electrical men everywhere, interesting information regarding the campaign and how they can profit by it. Before the week comes around the *Saturday Evening Post*,

Collier's, Scientific American, and many other national mediums will publish special electrical announcements. Collier's, with its million circulation, will have a regular issue devoted to electrical subjects.

National advertisers will participate in this and other similar issues. The campaign is being advertised as no other trade movement ever before in history. It only takes co-operative and individual sales work to tie this national publicity to individual business.

Co-operative Plans.

The Society is sending out booklets descriptive of the following subjects: "What the Central Station Can Do;" "What the Contractor and Dealer Can Do to Cash in;" "How to Put on a Slogan-Sign Campaign;" "How to Put on an Electrical Show or Demonstration;" "How to Put on an Electric-Vehicle Parade or Sociability Run." Also booklets to the employees of companies showing how they can participate.

First Things to Do.

Here are some suggestions which local committees and important men in other communities are doing in the Electrical Prosperity Week campaign.

One of the first and immediate steps is for the central-station managers, leading jobbers, dealers and contractors to meet and formulate primary plans for the campaign. Decide generally upon what you will do after reading the campaign literature, then go to the secretary of the Board of Trade, to the editors of the local newspapers, to the leading city officials and presidents of the Merchants Association, get them together and explain the value of a local celebration in this nation-wide campaign. Other cities are celebrating. They should do likewise. Explain how they can install holiday illumination, and why, even if they have no other incentive, they should begin their "Shop-early" movement bright and early before December is well begun.

Central Station.

Among those who will benefit most from the celebration are the central stations. They will furnish most of the current used for illumination and various other features of the week. After the celebration, they will supply service for the appliances and apparatus sold during the week by the dealers. Great numbers of these interests realizing the importance of the celebration to them, are extending their support and engaging actively in the work on the plans.

How the central station can co-operate toward making the week a success is outlined as follows:

Impress the various mercantile interests with the importance of the celebration as a trade stimulator. Show them how they can profit by conducting Electrical Prosperity Week sales of any goods they sell during the campaign and on until Christmas. They can feature their sales as Electrical Prosperity Week sales, or just prosperity sales. Possibly some of the merchants would not care to boost electricity too much.

Urge them to advertise in their local newspapers, and others. Advertise the fact that they use electricity for light, cash carrier systems, delivery, elevators and many other purposes.

Urge the merchants to light up during the celebration. Show them how unusual lighting of their stores at this time of year will help them to "cash-in" on their Christmas trade. The effect of the exterior illumination can be demonstrated by taking photographs of the store fronts, perforating them with pin pricks at the points where lights are to be installed and holding them up to the light.

One big city will install arches at each downtown corner. Advertisements for electric signs will be placed upon them.

If you have been contemplating starting a slogan sign or whiteway movement, Electrical Prosperity Week presents an opportune time when everybody will be thinking, talking and reading of electricity.

You should by all means light up the front end of your buildings with festoons, or other illuminating features, also some of the streets, if possible, and get the people awakened to what it is all about and why they should buy electrical goods for Christmas.

Bring out a special edition of your house organ, for the week, and induce other publications to do the same. The Society for Electrical Development is prepared to furnish a special matrix of the Electrical Prosperity Week design for the entire full page, or any section. It is also prepared to furnish interesting reading material regarding electricity and what it will do in different lines of business, in the homes and for the general pursuits of mankind. It will furnish long articles and short articles and make the whole thing of interest to the readers. This will be matter regarding your business which is bound to aid you in your sales campaign.

The advertising the papers will receive from not only electrical interests but other interests, will assure them a profit. Possibly only one paper should be used for an Electrical Prosperity Week edition. This rests with the local interests.

In Louisville, Ky., and Cincinnati, the newspapers will run a so-called "streamer head" across their first page reading "Electrical Prosperity Week, November 29 to December 4." You can impress the newspaper men with this fact, that here is a good chance for them to print an Electrical Prosperity Week edition or section of their paper, about November 28, which is the Sunday before the week begins. If your week begins on Saturday they might print it the Sunday before or in the middle of the week.

Do your part toward the holding of an electrical show in your town. Whether large or small, this feature cannot fail to interest the public and to make enthusiastic prospects out of many people who were formerly indifferent to electricity and its advantages.

Establish a "House Electrical" somewhere in your town. Secure the use of a vacant house on a good street. Put out some banners reading "Call at the House Electrical." Advertise it in the newspapers. Install some home electrical equipment. Furniture for two or three of the rooms or the entire house if necessary, could probably be borrowed from the local electric stores providing proper credit were given to them.

The affair could be in charge of two or three ladies and gentlemen representing the electrical interests. Demonstrations of electrical goods could be given and cards passed out showing where they could be purchased, if not on sale at the house. Banners could be put on the street cars reading "This car to the House Electrical." Some of the week's lithographs could be placed about the house to tie up the advertising campaign. A visitors' register could be maintained, so that each visitor who registered his or her name opposite a number in a book would be given a chance on some useful electric appliance. This is always a good stunt for such a campaign.

Another profitable feature which can be inaugurated during Electrical Prosperity Week will be the holding of a prize essay contest for the participation of the school children. These essays should be written upon "Electricity, the Builder of Efficiency" or a similar subject. This feature will arouse wide-spread interest in the event among all classes.

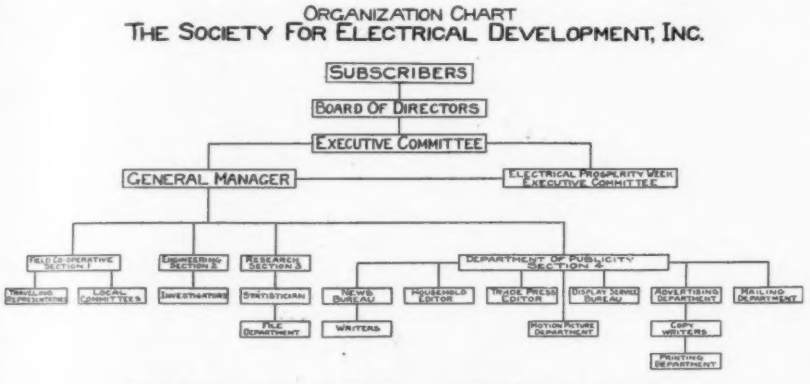
Induce the sign manufacturers and other electrical interests to co-operate with you in conducting a campaign for a slogan sign to be paid for by popular subscription. You will benefit by furnishing current for the sign. A good electric slogan sign gives any town individuality and advertising, the equal of which can not be obtained with a like expenditure in any other direction.

Electrical Prosperity Week will give an unprecedented opportunity to institute a wiring campaign that cannot fail to greatly increase the present and future business. Some cities will conduct wiring campaigns in which spe-

cial prices will be offered during the week as an inducement for the public to issue their orders at that time. Dealers and contractors can be induced to co-operate in the movement on a commission basis or by other satisfactory arrangements. That this feature is likely to pay, is shown by the fact that a number of representative central-station companies have already developed plans to carry out this feature.

Make liberal use of all the Electrical Prosperity Week co-operative helps provided by the Society for Electrical Development.

Do not hesitate to employ every form of advertising to spread the news of the week, and to give the week and its purposes the widest publicity. Make sure that the design for the week is present on every piece of printed matter you put out, whether it be a letterhead, envelope, billhead, or your monthly bill. And use cuts of this



Organization Chart of Society for Electrical Development.

design in all your newspaper advertising.

Hold an informal dinner and invite the architects, builders, contractors, and real estate men of the community. Provide good speakers to show them how they will profit by extending the use of electrical service in their locality.

A splendid feature for Electrical Prosperity Week would be an electrical parade, which can best be conducted under your auspices, or at least with your help. A "How-to" booklet has been issued on this subject.

If you have any window space available, make a display of electrical appliances suitable for Christmas gifts. If you sell appliances, conduct some kind of a special sale; a sale that means real benefit to all purchasers—but not necessarily a cut-price sale. If you do not sell appliances, make a display with comparative charts showing the way in which the cost of electricity has fallen, while the cost of other necessities has increased.

Electrical Dealers.

Display and demonstrate, during the week as never before. Outdo anything you have ever before attempted in your window-displays. The show window is a silent salesman. Its effectiveness is determined, as in the personal representative, by appearance, punch, arguments, and appeal. It has been unquestionably proved that quicker results can be obtained from window displays than from any other form of advertising. The articles shown in the windows are the material embodiment of the descriptions set forth in the advertising.

The show window is constantly on the watch with its never-tiring appeal. It is as efficient and attractive late at night as it is in the morning. It is a worker always on duty.

At night during Electrical Prosperity Week all windows should be brightly illuminated. Light of an unusual character attracts the eye. This feature may be the means of drawing many prospective buyers into the store who otherwise would pass it by. Color effects can be used to advantage in this connection. They will make it possible to cause various windows to stand out from those of neighboring establishments by contrast.

Use the lithographs and muslin signs, containing the announcement of the week, plentifully about your store and on your delivery vans. Stamp your packages with the poster stamps made especially for the event. Print the "Goddess Electra" emblem on your stationery. All of this material including electrotypes for printing can be had from the Society for Electrical Development at New York.

Co-operate with the central station in establishing a "House Electrical" and in putting on an electrical parade. It all means publicity and increased business for you.

Illuminate your store front. Prove to the public that you are thoroughly abreast of the times. People prefer to patronize the live merchants. Attention will be drawn to an attractive store front for a considerable distance away.

Offer to loan to a hotel or restaurant, various electrical cooking appliances, such as percolators, chafing-dishes, etc., which could be used on the table. These appliances would interest the guests and cause favorable comment. Get permission to hang a couple of lithographs or window cards in the lobby or hall. Have your name printed on every piece of advertising matter used.

Call up people you think would be interested in visiting your store during the week, and invite them to a special electrical luncheon. Try to find out in advance what they are particularly interested in, and have them come the day on which you are going to demonstrate these articles. Give an electric toy, a flashlight or something to the children, if a purchase of a certain amount is made. Advertise this boldly. It will bring the mothers into your store.

Have plenty of manufacturers' literature on hand for distribution during the week. A good way would be to distribute the literature according to daily demonstrations made, or in combination with the window-display.

Stamp on the inside cover of each booklet, a number, duplicating this number in a register, with space where name and address can be written. Run these numbers from zero to any number you wish. Advertise in advance of the week, by having circulars distributed by hand, that a number will be given out to all visitors at your store, which will entitle the holder to a chance on several prizes, exhibited in your store's display-window. The recipient of the booklet writes his name in the register opposite his number. The prize should not be given for several weeks after the event, the chief requirement to receive the prize being that the booklet containing the number be surrendered to the store at the time when the prize is given.

This expedient will not only prove highly valuable from the added attention the booklet will receive, but you will derive considerable free publicity not obtainable in any other way.

Have an "Odds and Ends" sale Saturday night. Many thrifty housewives will take advantage of this sale. All will be future customers.

Electrical Contractors.

Make the week a period of special efforts for contracts, preferably on a regular basis of prices. Some contractors will, however, advertise in the local papers both before and during the celebration that all contracts entered during the week will receive the benefit of a liberal discount.

Secure the names of the various manufacturers, large and small, in your vicinity, who are not using electric power. Send them a circular letter, or better still, a personal repre-

sentative, stating your reduced prices and giving them strong reasons why they should use motors.

The suggestion which has already been given to the central station upon the conducting of a wiring campaign applies with equal force to the contractor. If the central station puts on such a campaign, co-operate with them. If they do not engage in this feature, institute it yourself. Make a note of all the unwired buildings in town and then by letter, or personal call, let the owners know of your special rates for the week. Also make the project known to the builders and architects. Let everyone in town know that you are giving bargains during Electrical Prosperity Week that cannot be secured at any other time.

It has been found that with one or two rooms wired first, the owner wants the entire house wired in a very short time. A canvass should be made simultaneously with the newspaper advertising. Districts should be mapped out for the canvassers which should be covered in detail, until every section of the city has been covered. In some cities a premium has been offered to those who responded—a percolator, an electric iron or something of the kind. This special premium offer brings into line that class of people who are always looking for a "bargain."

Send your men to give illustrated lectures before various organizations. Show them the best methods of wiring homes and other buildings—where to locate the outlets to obtain the best results—the proper types and sizes of lamps to use for various purposes. Give illustrations of model installations. Distribute booklets on the subject. Show to the public most conclusively that electricity is not a luxury, but a willing, reliable and efficient 24-hour servant every day in the year.

Manufacturers and Jobbers.

Much of what has been said of co-operative plans for the central station and dealer will apply to the manufacturer and jobber.

Send forth your sales force to impress active co-operation in the event upon all with whom they come in contact.

Get out special bulletins, placards, banners and other advertising material which will feature the week, and send it to your dealers.

If you make appliances or fixtures for home use, induce women's clubs to hold meetings during the week. Have your representative there to give illustrated lectures and practical demonstrations. An electricially-prepared luncheon will go far toward interesting the housewives in electrical appliances and in attracting their good will toward your products.

General Co-Operation.

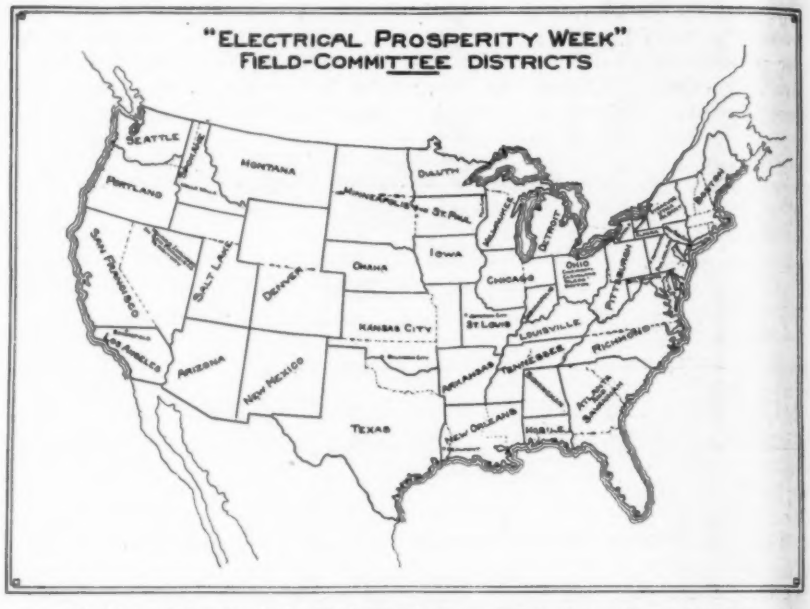
This campaign can be made profitable for every person in the country. It is the first time in history that an industry has got behind such a wonderful trade movement. The publicity that has been given to Electrical Prosperity Week will, in any event, awaken interest in electricity as never before. Every electrical man should assist in extending the scope of the campaign to take in the entire country and the people outside of the industry.

The public should be shown that electricity is safe, that it caused less than 1 per cent of the fires in Louisville, Cincinnati, and other cities last year, and only 3 per cent in New York City. They should learn how electricity is really "safety first" in the home, and that the home that "does it electrically" is better, more modern and more comfortable.

The Society for Electrical Development and the state committees are willing to do their share to help everyone to "cash-in" on Electrical Prosperity Week.

The billboard campaign that the society is putting on should be particularly effective in every city. The posters provided are eight-sheets (8 feet, 10 inches high by 6 feet, 8 inches wide) that can be used singly or be made up into 16 or 24 sheets. They present the "Goddess Electra" emblem of the big celebration, attractively lithographed in six colors. At the bottom is left a space for the name of the electrical firms making use of the posters. The posters will be placed on the most prominent billboards and will be displayed during the time when numerous other means are being used to promote electricity, and Electrical Prosperity Week. The use of these broadsides will therefore be of timely advantage to every central station and merchant.

The rallying of the electrical interests, in ever increasing numbers, in every branch of the industry, all over the country, makes it more and more apparent that this celebration will not only be unprecedented in the history of sales movements, but will be the most successful. A story of Electrical Prosperity Week, however brief, would be incomplete without tribute being paid to the Society for Electrical Development, Inc. The annals of industry offer no illustration of such amazing, co-operative effort on behalf of every branch and every individual within its field. A model association of leading representatives of various branches, the society has inspired the entire industry with new ambitions, new zeal, new ideas and a determination to make the twentieth century an electrical era to the minutest phase of daily doing.



Division of Country Into Field Districts for Efficient Handling of Work.

To show to the public the possibilities of electricity, the Society for Electrical Development, Inc., was formed. Its name is significant of its object. It was born of the industry and to its welfare it is dedicated.

Its object is to diffuse knowledge of electrical matters among the people so that they may appreciate the numerous advantages of complete electric service—and use it.

Its mission is to develop the industry as a whole. It is maintained, governed and operated by the interests it represents—the central stations, dealers, contractors, jobbers and manufacturers.

Its headquarters are in New York.

but this does not make it an eastern institution. Its directors reside and do business in all parts of the United States and Canada. Its staff of employees know America in its entirety. They are at home in San Diego, Cal., and in Eastport, Me., in Key West and in Seattle. They have studied at first hand the sales problems of each state and are giving the members the benefit.

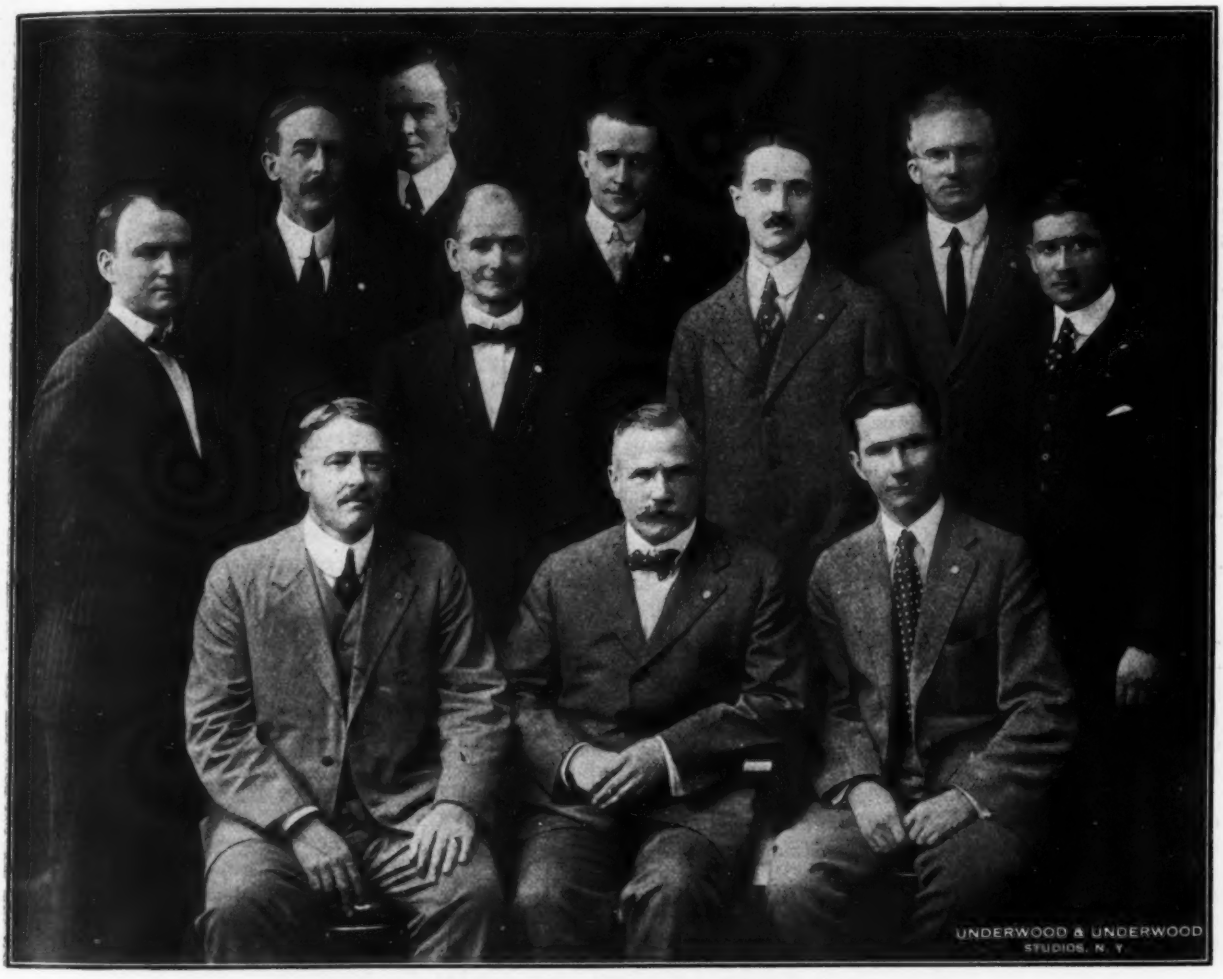
Electrical Prosperity Week was conceived and is being directed by the society.

material for over forty of these pages. They contain news of electrical progress, household hints and anecdotes well illustrated and written in a style to be understood by the lay reader. Catchy cartoons add to the interest of the page. Advertising furnished by the electrical interests, pays the publishers for carrying the page.

Motion pictures constitute another medium that the society has employed to good advantage in spreading its gospel. It is estimated that over 35,000,000 people have witnessed film

problems. People from all walks of life thus see electricity at work and receive the appeal.

Merchandising constitutes a strong arm of the society's work. An extensive display bureau is maintained which supplies to members a regular service, consisting of illustrated designs for window displays, instructions in sign lettering, methods of selling, suggestions for electrical show exhibits and answers to all inquiries by the members on general merchandising. Its book entitled "101 Successful Sell-



A Portion of the Staff of the Society for Electrical Development.
Left to right, upper row: John Tyrone Kelly, Theodore Dwight, A. J. Edgell, James Smieton, Jr., William W. Ayres, John A. Randolph, C. Ridderhof, John J. Reardon.
Left to right, lower row: James P. Mallett, James M. Wakeman, H. W. Alexander.

Activities That Have Brought Results.

Publicity is the spice of merchandising. The society through its many mediums for bringing electricity and its advantages before the public, has directly or indirectly been influential in effecting the sale and use of many electrical appliances. Through its electrical page mat service, it has reached millions of people, with an appeal for increased efficiency and economy through electrical service. It is now supplying reading matter and

dramas produced with the aid of the society. One department of its organization is devoted exclusively to this feature. Five films are now appearing in hundreds of theaters throughout the country. They are respectively entitled: "Let There Be Light," "This Is The Life," "The Tightwad," "The Modern Rip Van Winkle," and "The Newer Way."

They depict stories of intense dramatic interest woven around scenes and incidents wherein electrical appliances are made to solve crucial

ing Suggestions," has become popular with salesmen wherever it has been sent. It contains the best of hundreds of plans which have been tried out by actual service and found successful. The suggestions were sent in from all over the country by commercial men, in response to a general request.

The society maintains a field staff of representatives who devote a large part of their time to lecturing before various leagues, clubs and organizations upon the advantages of electricity.

The society's household economy department has furnished upon request many illustrated electrical articles for the women's pages in popular magazines. It has aided housewives' leagues in the preparation of demonstrations on electrical cookery and general domestic uses of electrical appliances.

The trade-press bureau has reached the manufacturers and tradesmen through articles setting forth the advantages of electric power and light in commercial and industrial establishments.

Advertising as a help for the industry has not been overlooked by the society. An advertising bureau is maintained where members can secure free advice on the preparation of their advertising copy—how best to conduct the publicity for sales campaigns, to prepare booklets, price lists, and circular letters. This department has rendered much valuable assistance in this direction.

The foregoing are only a few of the many services which the society is rendering to the electrical industry, in its continuous work of instruction and publicity.

Organization.

The society had its inception in October, 1912, when a number of the foremost men of the industry—live wires with records of achievemnt—met in New York and decided to form an organization by which the many units of the electrical industry could join hands in a co-operative propaganda of electrical publicity and instruction which would bring electricity more closely to the lay public. They gave the slogan "Do It Electrically" to the society and set it up in business at the Engineering Socities Building in New York City.

Although it has not been long in existence, the excellence of its organization and the competence of its staff are winning it a place as one of the most potential business welfare factors the electrical industry has ever known.

Officers and Staff.

The official personnel is composed of the following well known men:

Henry L. Doherty, president.
W. H. Johnson, vice-president.
A. W. Burchard, vice-president.
W. E. Robertson, vice-president.
J. Robert Crouse, vice-president.
Ernest Freeman, vice-president.
J. M. Wakeman, general manager.
J. Smieton, secretary-treasurer.

In addition to the officers, the society has on its staff some of the foremost sales, publicity and engineering experts in the country.

J. M. Wakeman, the general manager, is one of the best known men in the electrical industry. Some of the many positions which have formed a part of his broad experience are: former president of American Trade Press Association; former vice-president and general manager, McGraw Publishing Company. He has taken a leading part in practically every movement for the welfare of the electrical industry for years.

H. W. Alexander, the director of publicity, was formerly the general sales manager of the Federal Light & Traction Company. He has also been prominently identified at various times with leading newspapers, having been at one time on the editorial staff of the *Chicago Inter Ocean*. He is a specialist in national business getting campaigns and a writer of note on public-utility problems.

George B. Muldaur, manager, Field Co-Operation Bureau, is an experienced electrical engineer and lecturer. Mr. Muldaur and his assistants have visited every city of 100,000 population or over in the United States and many smaller cities, addressing public meetings on the work of this society.

Theodore Dwight who has charge of the Commercial Section was former assistant to vice-president and general manager of General Electric Company; former assistant secretary and treasurer of American Institute of Mining Engineers and later director of the Institute for several terms; trustee, United Engineering Society; member, leading electric, mining and engineering societies.

J. P. Mallett, of the Engineering Division, was former chief engineer, Northern Electrical Manufacturing Company; former engineering chief, Diehl Manufacturing Company; six years in the engineering department of the Westinghouse Electric & Manufacturing Company. He is a leading engineer in industrial investigation and research work.

J. T. Kelly, who has charge of the News Bureau, was prior to his present position, the eastern publicity manager of the Panama-Pacific International Exposition. He has had 15 years of successful experience at newspaper work, some of his former connections having been with the *New York Evening World*, the *Buffalo Courier*, *St. Louis Republic* and the *Washington Post*.

C. Ridderhof, manager of the Advertising Department was formerly manager, Advertising Department, Hotpoint Electric Heating Company; former assistant manager, Western Gas Engine Corporation; former manager, Wilmarth & Morman Company. He has conducted many profitable advertising campaigns and is a widely recognized sales specialist.

A. J. Edgell, manager, Display Service Bureau, is president of the International Association of Display Men; president, Greater New York Display Men's Association. He was the winner of the first prize of $1,000 offered by the Rice Leaders of World Association in a competition on a best sales program. He is an authority and writer on window displays.

John A. Randolph, trade press editor, was formerly power engineer of the New York Edison Company. He is a widely recognized authority on technical electrical articles.

Miss Grace T. Hadley is in charge of the Household Efficiency Department. She was formerly connected with the editorial staff of *Popular Electricity*. She has made a careful study of the application of electrical appliances to the home. The many articles, which she has contributed to various women's magazines throughout the country, have given her a reputation as an expert in her line.

John J. Reardon, assistant news bureau, was former assistant Sunday editor *New York Herald*. He is a newspaper writer of wide note.

William W. Ayers, advertising department, was former assistant, Agricultural Promotion Department, Long Island Railroad.

George W. Hill, assistant field co-operator, was formerly one of the Sales Division Heads of the Westinghouse Lamp Company. He is well known in lamp circles.

H. W. Matthew, Pacific Coast representative of the society, is the Coast representative of the McGraw publications. He is widely known among central-station men, manufacturers and dealers.

Electrical Prosperity Week Plans In Different Cities.

In all parts of the country, plans for cashing-in on Electrical Prosperity Week have been developed. Armies of workmen throughout the nation are actively engaged upon the construction features, while hundreds of committees and executives are giving the final touch to arrangements which will enable the event to measure up to expectations.

Brooklyn, N. Y., is to have an electrical show. Another feature will be a far-reaching house-wiring campaign conducted by the Edison Electric Illuminating Company of Brooklyn in conjunction with the contractors, a special discount in prices being given on all contracts written up during the week. Electrical dealers will co-operate by window displays designed especially for the week. The public interest in the celebration will be further intensified by illumination of prominent buildings and arches.

In Philadelphia, the electrical interests will conduct a wiring campaign in which a discount of $1.00 per outlet will

be allowed on the wiring of all ready-built dwellings and stores. The Philadelphia Electric Company will hold special appliance exhibit and demonstrations including special window displays and exterior decorations. Special advertising giving publicity to Electrical Prosperity Week and to electricity in general will be conducted in the street cars. The newspaper advertising of the electrical interests will also be greatly increased.

Plans are also under way in Philadelphia to construct four allegorical, electrically lighted floats to parade in various sections of the city on different nights during the week. One float will be devoted to general lamp illumination, another will depict allegorically electric power, a third will be devoted to a general figurative display of illumination. The fourth float, with the assistance of a trailer, will give moving picture demonstrations of domestic applications of electricity.

Big plans for participation in the celebration are now under active consideration by the electrical men of Buffalo. The intense enthusiasm which has been shown in the various meetings held to discuss the proposition, would seem to indicate that this enterprising city will be on the cash-in line when the week transpires.

Milwaukee is to have various demonstration and display features of a highly interesting and instructive nature. The celebration will be extensively featured in newspaper and bill-board advertising. One of the many features will comprise a large construction car of the railway company which will be specially decorated and kept on the streets every day during the week. Another feature will consist of special film exhibitions which will be conducted at the motion picture houses.

In Cincinnati it is planned to light all the large office buildings from 7:30 to 9:30 every night of Electrical Prosperity Week. An electrical show will also be held in which most of the electrical interests of that locality will participate.

It is announced by the Denver Gas & Electric Company that a grand celebration will be held in Denver, the climax being a prosperity show to be held on the last four days of the week, under the auspices of the Colorado Electric Club. An electric automobile parade is also contemplated. Various spectacular features are under construction which are likely to draw crowds to the electrical show and the features offered in the vicinity thereof. Some of the features planned consist of: the operation on a miniature scale, by wireless, of the maneuvers of a battleship; a facsimile of a submarine; an aerial or Zeppelin battle; and various high-frequency electrical discharge features.

Among the foremost boosters for Electrical Prosperity Week are the electrical interests of Salt Lake City. Flood lighting of the Capitol in Salt Lake City is the feature of a series of novel illuminations arranged by Utah's committee. During the week searchlights will play about the city and mountains. In its comprehensive program reported by Secretary A. R. Loughborough, of the Western Electric Company, the committee includes an Electric Show; lighting of all office buildings; an electric vehicle endurance run; guessing contests on the amount of candlepower in some unusual lighting display; demonstrations in the University of Utah and in Domestic Science Department of the Agricultural College of Utah.

Even the corner stone of Salt Lake City's new "White Way" will be laid during the week. It has arranged for motion-picture reels for all Utah's theaters for the week. It has decided its "drive" will be: "Make your Christmas present an electrical one." Utah aims to get people on the street at night at well as during the day.

The Louisville Gas & Electric Company reports that an amusement company has been formed to hold a festival at the armory in that city, under the auspices of the Jovians. The electrical interests will cash-in on the festival by maintaining attractive exhibits, these, featuring things electrical. An electrical parade will also be held of which a large number of electric vehicles of various types will form a prominent part. The local organization of boy scouts will march in the parade, each boy carrying an electric lantern.

Thus far definite plans have been formulated for holding electrical shows in over 22 leading cities of the United States. Many others have this feature under serious consideration.

Mayors of numerous cities together with many civic organizations have enthusiastically endorsed the week and are actively engaged upon carrying out various plans for its support.

Electrical interests throughout the entire nation are very enthusiastic over the celebration. It therefore seems certain that the event will surpass all trade movements ever conducted heretofore and that it will prove highly creditable to the electrical industry.

Prosperity Week In Louisville.

An electrical festival and bazaar at the Armory in Louisville, Ky., will be the center of Electrical Prosperity Week in Louisville. Here will be a complete display of all manner of electrical appliances, etc., and an amusement feature which will be designed to carry out the idea of prosperity. This will be on the order of a carnival which will work out the detailed plans of the Louisville Jovians. Electrical features will be made as much of as possible. Admission to the "Midway" section, where a professional company will have some 30 separate shows, will be by way of a box office where for $1 the visitor will be issued $100,000 in phoney money. A nickel in real money will be represented by $5,000 in the paper currency and it will take $10,000 to get into any concession. The idea is that people who attend will talk in terms of great wealth. "I spent $200,000 at the Armory last night," for instance. On one night a robbery of the midway bank will be staged and the robbers will get some $15,000,000. Admission to the Armory will be 10 cents. The Louisville Gas & Electric Company will distribute tickets to all its customers, the contractors and appliance dealers, etc. Friday night of this week will see the electrical parade in which every electrically propelled vehicle in the city will be pressed into service, as far as possible. The local Jovian League has named some ten committees, one to supervise the amusements at the Armory, one the appliance display, one to prepare for the parade, one to supervise decoration of the city, festoon lights being already provided for, one to induce the local merchants and commercial interests to put electrical matters to the front, one to work with the motion-picture theaters to emphasize prosperity and electricity and to use special slides.

Prosperity Week Committeemen Meet at Boston.

Plans for the observance of Electrical Prosperity Week in New England were discussed at a meeting of about 50 members of committees for as many cities at the Engineers' Club, Boston, October 21. The meeting was called by W. H. Atkins, of the Boston Edison Company, in the absence of Chairman Charles L. Edgar, of the New England Committee-at-Large.

Mr. Atkinson presided and outlined the method of organization. There are 60 committees actively working for the success of the Week, in their respective centers.

J. M. Wakeman, general manager of the Society for Electrical Development, presented some new projects in connection with the celebration. The flood lighting of public buildings in various New England cities will be a feature. Authorities are being induced to have temporary white way lighting installed, and local merchants will make special efforts to bring the electric idea to the front.

The word "Prosperity" has caught on, said Mr. Wakeman, especially with the newspapers, who see in it a good omen for industrial activity in general. Up to the present time more than $300,-

000 worth of reading notice has been given freely by the daily press. This is more publicity than has been given to any campaign except a presidential election.

The speaker held that the central station is the most important single factor in the upbuilding of every city, especially where there is a diversity of industries. It is in a peculiarly advantageous position to boost community growth. Opportunity is at hand to organize and reap large returns from stimulated uses of electricity.

L. D. Gibbs, superintendent of advertising for the Edison Company, of Boston, said that that company would fully utilize the punch and pull of the national movement. About 4,000 placards have been put in street cars, 500 7-by-10-foot posters have been displayed on billboards, 100,000 leaflets are to be distributed with lamp renewals, and 150 contractors in the 42 cities and towns of Edison territory will be supplied with the leaflets, through the company.

Each town and city will probably floodlight some public building or block. An exhibition by the Rotary Club at Horticultural Hall, Boston, November 16-20, will include booths of the Edison Company and of prominent jobbers. Half-page advertisements featuring the two-cent cooking rate put in force October 1, are being displayed in theater programs.

Mr. Gibbs pointed out the advantage of having advertising of a uniform appearance, thus making trip-hammer blows on the public mind.

Preceding the meeting the committee members were guests of the Boston Edison Company at luncheon.

Dayton Jovians Celebrate Opening of New Hotel.

The recent opening of Dayton's official Jovian hotel, the "Miami," was celebrated in a proper manner on Monday evening, October 25, when 150 Dayton Jovians sat down to a banquet in the ball room of this new million-dollar hotel.

Following the dinner there was a very interesting program, in which S. G. McMeen, the president of the Chio State Telephone Company, of Columbus, Ohio, was the principal speaker, his subject being "Telephones." Thomas A. Wynne, the vice-president and general manager of the Indianapolis Light & Heat Company, and the new Reigning Jupiter of the Jovian Order, also spoke, his subject being "Organization." This was Reigning Jupiter Wynne's first public appearance since being elected the fourteenth Jupiter of the Jovian Order. Mr. Wynne was followed by Thomas J. Ryan, the president of the Cincinnati Electric Club.

Electrical Exhibit Company Formed in Cincinnati.

Electrical men interested in the coming celebration of Electrical Prosperity Week in Cincinnati have organized a company to handle the exhibits and take care of other details connected with the proposed display at Music Hall. The company is to be known as the Cincinnati Electrical Show Company, and while the initial capital stock is fixed at only $1,000, it is contemplated that it may be expanded to meet requirements. Stock will be sold to the manufacturing and other concerns taking space for exhibits. The company will be a permanent organization, maintained for the purpose of handling future shows of the sort which is planned for the week of November 29. The incorporators are W. W. Freeman, of the Union Gas & Electric Company; J. A. Brett, T. J. Ryan, W. G. Reuter, C. T. Milnor and H. Serkowich.

Prosperity Week Show in Sandusky.

A special committee, with members representing all of the leading electric, public service and civic bodies of Sandusky, O., has been formed to arrange the details of the elaborate electrical display which will be held in connection with the celebration of "Electrical Prosperity Week" in that city. H. H. Squires, representing the electrical contractors, is chairman of the committee. A special trip to Milan, O., the birthplace of Thomas Edison, is planned as an interesting feature of the Sandusky celebration, as the village is only a few miles away.

The Future of California Electric Railways.

At the meeting of the Jovian Electrical League of Southern California, held at Los Angeles on October 21, a paper was read by Paul Shoup, president of the Pacific Electric Railway Company, on the conditions confronting the electric railways of the state.

Mr. Shoup pointed out that the electric railways of the state are not doing well, and gave statements of the operating revenue and expenses for the past three years for 22 electric railways of the state. The net revenue, out of which interest and other fixed charges must be paid, was shown to be greatly diminished in every case, and in several cases there was actually a net deficit. There were only a few roads in the state not included in his synopsis, and figures for these were not available. Many operating expenses have increased, and the railroads have been powerless to prevent such increases. This statement applies to paving maintenance, the operation of safety devices, reconstruction expenses required by local government boards, and taxes. It is also true that most of the interurban lines were not earning all of their fixed charges three years ago, and in the meantime have had to make increased investments in paving and track reconstruction. Many of the railways have not earned sufficient to pay interest on their outstanding debts. In some cases they are in the hands of their creditors, while in others the stockholders are carrying the road along.

The situation is at the present time very serious, and it is as important for the communities served and for those desiring to have service extended to them, as it is to the stockholders and employees of the companies. The causes may be summarized as business depression, the development of the automobile and good roads, franchises which require maintenance of street paving, increased taxes, increased safety precautions, jitneys, etc. Mr. Shoup said there had been no increase in earnings sufficient to justify the increased cost of paving which is frequently required, especially as it is done under a limited-term franchise. He showed that the tendency of taxes was to increase, and at the present they are over five per cent of the gross revenue.

Of the causes that can be controlled by the public the competition of the jitney is the most important. These conveyances take part of the business without taking any of the obligations and responsibilities to the public. Interurban jitneys are not regulated at all. They develop no new territory, but ply only where there is profitable business in single and round trips without taking care of the commuters. It is idle to prove that a jitney is not an economic possibility. It is here just the same.

What is to be done about it? This depends upon the understanding, cooperation and good judgment of the public. If the situation is not changed extensions will cease, service will be curtailed and the weakest branches abandoned. Reductions will be made wherever possible, involving a curtailment of employment on cars, in shops and in new construction. Commutation rates will have to be readjusted.

In conclusion he said that the electric railways have a right to ask that competition by jitneys be asked to take on equal responsibilities and obligations with the railways; that paralleling of existing lines be avoided; that increases in taxation be discontinued; that modifications in paving requirements be made, and that rates be permitted which will provide adequate revenue.

Commercial Practice
Management, Rates, New Business

Unique Brooklyn Central-Station Exhibit.

One of the interesting exhibits at the recent New York Electrical Show, at Grand Central Palace, was that of the Edison Electric Illuminating Company, of Brooklyn, where a 100-foot panorama of "Industrial Brooklyn in 1915" was shown. The accompanying illustration gives an idea of the completeness of this exhibit, the models

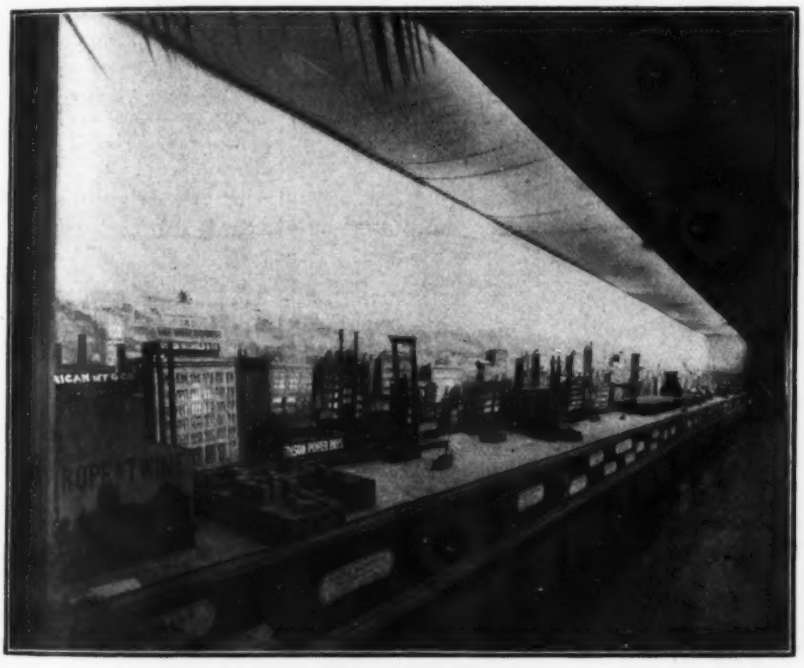


Exhibit of Brooklyn Edison Company.

in the foreground being exact reproductions of the buildings represented. Elaborate electrical and mechanical effects were used, including 900 miniature incandescent lamps used for illuminating the piers, docks, ferry-slips and boats. The lamps are said to be the smallest ever manufactured.

The exhibit attracted much attention and by means of explanatory placards indicated the wide use of central-station service in the important industrial plants of the city.

Giving of Premiums Stimulates House-Wiring Orders.

The increased number of already-built residences wired for electric service during the first ten months of 1915 at Minneapolis indicates the degree of prosperity prevailing in that city. The sales department of the Minneapolis General Electric Company, up to October 1 had taken orders for wiring 1,421 residences, while the independent efforts of the electrical contractors probably produced several times this amount of business. These figures take no account of new residences built during the year, practically all of which are wired, and apartment buildings are classified as single houses. The number of orders taken by the company was a 28 per cent increase over the first ten months of 1914, and double the number of contracts taken in the corresponding period of 1913. Much of the success of this season's efforts is attributed to the giving of electrical appliance premiums to customers of the company who submitted the names of prospects for house wiring and the advertising in connection with the plan. If the company's salesmen were successful in closing orders the customer giving the name of the prospect received a choice of a list of electrical devices, such as flat irons, toasters, table stoves, coffee percolators, etc.

The number of new lighting customers gained by the Minneapolis General Electric Company for the month of October will approximate 1,000, this probably representing a high-water mark in the history of the organization. On October 22 all records for a single day's electrical output were broken by the disposition of 475,100 kilowatt-hours of energy.

City Officials Praise Utility for Good Service.

Under present conditions in the public utility field, with practically all companies earnestly striving to live up to the slogan of "service first," it is not uncommon for customers to write letters of praise regarding the service being rendered. It is, however, rather a rare occurrence for a city official to so express himself.

The Dayton (O.) Power & Light Company is, therefore, particularly proud of two letters recently received from city officials, one from Mayor G. W. Shroyer and one from City Manager H. M. Waite, complimenting the company on the service rendered in two emergencies. The letter from Mayor Schroyer is as follows:

"I wish to thank you very much for the prompt action that you gave on my request, with reference to one of the lamps on the corner of Potomac and McLain Streets, which was complained of by a neighbor, with reference to its not being lighted. In less than an hour after I called the light was burning. This I consider extremely good service."

Mr. Waite wrote in reference to service rendered him as a private customer, as follows:

"May I take this opportunity of congratulating you upon your service, as last night shortly after the storm they called up the house and asked about the lights and when told that they were out a man was on the job and had them in again in ten minutes."

Central-Station Exhibit of Rural Applications.

The Oregon Power Company, in conjunction with the Portland Railway, Light & Power Company and the Pacific Light & Power Company, held an exhibit at the Oregon State Fair at Salem, known as "Electricity on the Farm."

Intensive Business Cultivation at Kansas City.

The experience of the Kansas City Electric Light Company, gained in an intensive business campaign, suggests some very interesting possibilities for increasing the use of electricity in homes, as well as increasing the number of users. The company has had three census takers covering the city this summer, calling at each house and ascertaining whether or not electricity is used and if so to what extent. The reports of these men are turned into the sales department, and show the possibilities for wiring houses, selling equipment, and stimulating the use of electricity.

One interesting phase of this work is the possibility opening up for putting the equipment of wired houses into complete use. In many houses one small thing or another is out of order, which interferes with the use of one or more pieces of equipment. In one house, for instance, there may be a switch not working. In another house a part of a fixture may be out of order, which prevents the use of one or more sockets or devices. While the census taker in the Kansas City plan discovers these defects the meter men also are available for making reports on these conditions. The agents of the company who observe defects or learn of them on inquiry, suggest to the customer the name of a repair man in the neighborhood who can replace or repair the equipment. In a few blocks there are usually a dozen or more cases of such repairs, and the names of the householders are given to the men of a shop in the neighborhood. The repair man can visit all these houses on one trip, making the necessary correction at a comparatively small cost to him and to the householder. In most cases it is merely negligence that prevents the repair of the equipment and the greater use of current. By facilitating the making of such repairs or adjustments as are necessary, not only is the use of electricity increased in that house, even though slightly, but the satisfaction of the customer with the service is enhanced.

Galena Plant Makes New Record.

The largest day's output of electrical energy in the history of the Interstate Light & Power Company, Galena, Ill., occurred during the week ending October 15. The disposition for that day was 77,400 kilowatt-hours, and the station load-factor was 65.6 per cent. Manager Rickeman says: "Indications are that the output and load will steadily increase during the next three or four months."

Unique Type of Central-Station Newspaper Advertising.

The Topeka (Kans.) Edison Company has for several months been using its Sunday display space in the newspapers for the publication of a miniature weekly newspaper entitled "Current Topics." In this space, which is three columns wide and 10 inches high, the company has published in the form of news notes and stories the progress in the use of electricity in Topeka, giving explicit notes of new installations, both in homes and factories, and presenting subjects for the further use of electricity by persons not already enjoying the full benefit of their opportunities. The items and articles are brightly written and the generous use of names gives a personal and human-interest touch to the columns that undoubtedly is helping very materially to popularize the public service corporation. Such small items are printed, for instance, as the names of persons who have bought devices, the addresses being published, also the larger installations in the factories. Interesting stories are included on novel electrical installations. In the course of a few months a very large part of the field has been covered. While no direct returns, it is said, are traced to this form of advertising, it is believed by the officers of the company and by other observers, that the method has been of very great service in a general way.

CURRENT TOPICS

A LIVE WIRE PUBLICATION DEVOTED TO BRIGHTER HOMES

VOL. 1 TOPEKA, JUNE 12, 1915 NO. 9

BUYS ELECTRIC RANGE

Electric Irons, Toasters, Stoves and Washers Bought by Topekans.

F W Watson, the well known nurseryman of North Topeka, has purchased an Electric Range, preparatory to going to Topinabee, Mich., where he and his family will spend the summer, and in order to be thoroughly comfortable and enjoy the hot months, they will do their cooking by electricity, taking their range with them for the purpose

Many Topekans cannot go away for the summer but they can enjoy their summer at home by doing their cooking with electricity, thus cutting out the hot stoves which heat up the entire house

J E Gossett of 518 Garfield has determined to get a good measure of relief by purchasing an electric toaster A toaster of course will not do the work a range does, but it will cook breakfast and do any kind of light cooking It will reduce the problems of the cooking question more than half If she can't have a range every house wife should have a toaster

Viola Gustason of 221 Jackson street, purchased an electric washer and will do all her washing quickly and better at the minimum cost of .5 cents for power

The purchase of electric irons goes merrily on and this great little convenience is gradually making its way into every home in Topeka. The following bought irons the past week Mrs C M Alexander of 809 West 11th street Mrs F D Peck of 515 Lincoln Mrs W C Donnell 330 Laurel Mrs C N Horn 221 Lake Gene Pryor 1315 Tyler Mrs J M Cayler, 1032 N Central

There is nothing more useful to have in the home than an electric iron

TINY ELECTRICAL MOTOR

One-Fiftieth Horse Power Runs New Topeka Invention.

The smallest electric motor in use in Topeka or perhaps in the West will be a one-fiftieth horse power motor being manufactured in New York by the General Electric Company for the Pierson Transmitter Company of this city The motor will be fitted to the newly invented automatic telegraph sending machine being manufactured here by the Pierson Company

This sending machine is operated with a keyboard, like a typewriter The message is put on the machine and the machine then transmits it over the wires If the operator in the other city is busy, he can take the message from the machine whenever he gets to it No operators are done away with, as the message is placed on the machine in the Morse code, as now, hence skilled workmen are required, but messages will be sent with much greater accuracy and speed, and both receiving and sending will be facilitated

The Pierson Company has purchased the building formerly occupied by the Jensen Manufacturing Company at Eighth and Santa Fe railroad, and is remodeling it for general offices and factory

35 HOMES IN A WEEK

The West Part of Topeka Is Rapidly Being Electrified

The west part of Topeka was already keeping abreast of the other sections of the city pretty well in electrifying her homes, but it seems that the fever for brighter homes is just now taking strong hold

Within the past week no less than 35 citizens of that part of the city have contracted for electric current They are

W A Fultz 252 Salina J M Gurley 209 Washburn J M Gurley, 208 Washburn Angie T DePriest 628 Fillmore G F Harries, opposite Gage Park school, R D Tucker, Seventh and Prospect, John O'Vara, 210 Washburn Mrs M A Gibbens, Evans and Washburn, W S Cole 1224 Wayne Gage Olsen, 1025 Lane S Morgan, 1185 Washburn J W Winter, 1410 Buchanan I C Todd, 1107 Lane A E Lindgren 900 College Frank Sachs Ridge and Munson R E Morse 1325 Kansas avenue, J McKee, 1221 Wayne E F Huffer, 1706 West J Roller, 1231 Wayne, S R Reeves, 100 Evans J C Brown, 319 Roosevelt W G Shillinglaw, 305 Roosevelt M Grant, 1813 W 6th, B Weddington, 612 College, A Farris, 920 College, G S Oliver, 947 College E Edwards, 901 College, William Buffington, 1047 Exeter, D Dodson 1805 W 6th, Mrs H Woodall, 1162 King Rev Frank Wilson, 1114 Buchanan Mrs M F Clark, 1153 Lane D F Mallory 1415 Van Buren R Meador 1012 Grand

BUSY ON EAST SIDE

Many Home Owners Are Making Houses Brighter.

The east part of the city is still brightening up Illumination engineers of the Edison company made estimates the past week for nine citizens, all of whom accepted them and signed an order for the installation of the Better Lights They are

D D Irgun, 522 E 8th W F L Klinge, 1613 E 3rd Henry Heber 511 Locust Mrs D E Hinshaw, 626 Lawrence Harry McNair, 515 Locust B R Rose, 1205 Washington David Steel, 611 E 12th, M V Wright, 1201 Washington

Remember the Edison company doesn't charge anything at all for sending their engineers out to make up estimates for wiring, whether you contract for wiring now or not Telephone 4040 and ask for one of them to come out and give you an estimate of the cost of wiring your house

Style of Newspaper Advertising Used by Topeka Company.

These ranges made most favorable impressions on all visitors to the company's show-room. The pushing of these Globe electrics, in connection with the three-cent cooking rate in use in Scranton, is looked upon by the Electric Company as a favorable business transaction.

Electric Cooking Campaign in Scranton.

On October 28 the Scranton Electric Company, of Scranton, Pa., inaugurated an electric cooking campaign using Globe electric ranges manufactured by the Globe Stove & Range Company, Kokomo, Ind.

Electric Delivery Company for Chicago.

The Union Motor Transfer Company, of Chicago, has recently been incorporated to do a general delivery and haulage business in that city. Electric vehicles will be used exclusively.

House-Wiring Campaign Successful in Lynn.

The Lynn (Mass.) Gas & Electric Company is conducting a successful house-wiring campaign, securing the contracts from house owners and, if desired, financing the cost of the installation, the owner paying the company in twelve monthly installments.

The business is distributed among the contractors of the city, the prices charged for installation being reckoned on the basis of outlets plus the introduction of service into the building.

There are two forms of contract, one covering an agreement between the owner and contractor direct, and the other a three-party contract under

LOCATION	⊕	Ck.	PRICE	Fixtures	TOTAL
Service	$11.00				
Cellar Outlet, Switch	5.50				
Piazza, Outlet, Switch	7.75				
Hall, Outlet, Switch	7.75				
Parlor, Outlet, Switch	7.75				
Dining Rm. Outlet, Switch	7.75				
Kitchen Outlet	3.25				
Pantry Outlet	3.25				
China Closet Outlet	3.25				
Back Hall Outlet	3.25				
2d Hall Outlet	3.25				
Bath, Outlet and Switch	7.75				
Chamber	3.25				
Chamber	3.25				
Chamber	3.25				
Chamber	3.25				
Other Outlets	3.25				
Outlets on 1st Floor with Flush Plug Receptacle	4.50				
Extra Switches	1.50				
Three-way Switches	6.75				
For each additional floor above the first floor add to 1	6.50				
Special Wiring					
Bryant Heater Control, Comb. No. 437	4.50				
Allowance for Switches	3.25				
FIXTURES					
Hall	2.00				
Piazza	1.00				
Parlor	4.50				
Kitchen and Pantry	1.25				
Back Room	1.40				
Dining Room	5.00				
Bed Room Brackets	1.40				

House-Wiring Price List Used in Lynn Campaign.

which the central station agrees to pay the contractor for the work, the owner to repay the amount to the company.

A price schedule is established for service, switches and outlets, in accordance with the estimate blank herewith reproduced. Fixtures are supplied at prices advertised in a catalog showing styles and types of glass, etc.

Fixtures installed in connection with the offer are: Opal ball for porch, single-lamp shower for hall, three-light brass link fixture for parlor, side bracket for bathroom or bedroom, three-light pendent chain chandelier for dining room.

Three-way switches are recommended for the halls, and a buzzer switch for the head of cellar or foot of attic stairs. The usefulness of wall or baseboard receptacles, for the attachment of portable lamps, vacuum cleaners, vibrators, toasters, percolators, washing machines and other domestic appliances, is pointed out.

Though the Lynn company is a combination gas and electric company, the circulars issued specifically state that with the use of the new Mazda lamps the cost of electric light is only about one-third of its former price, "making it the cheapest form of illumination."

Kansas City Company Sells Many Appliances During Ten-Day Show.

The fall festival electric of the Kansas City Electric Light Company was particularly successful this year in point of business produced. Miss Marie J. Russell, manager of the Electric Shop, reports that there were ten thousand visitors during the ten days; and that an unusually large proportion of them were purchasers and probable purchasers of electrical equipment. The connected load added during the ten days exceeded that of any other month during the year, except that in which the recent iron sale was conducted. The amount of goods sold was twice that of any ordinary month's business, and included nearly everything from a percolator to a washing machine. Electric grills were especially popular. Despite the big iron sale in June, more than 500 irons were sold during the ten days.

Portion of Exhibit Space of Kansas City Electric Light Company During Show.

United Company Holds Annual Booster Sales Meeting.

With the completion of the 201st Street generating station of The United Electric Light & Power Company, located at 201st Street, Sherman Creek and the Harlem River, New York, the company began an intensive campaign for new business. The sales department was considerably augmented and the work of increasing the connected load continued with energy.

Two years ago Joseph F. Becker, sales manager for the company, inaugurated what he termed a "Booster" meeting at which the entire sales force together with the heads of other departments interested in the promotion work and the officials of the company, were gathered, for the purpose of starting the new-business campaign with enthusiasm and to bring to the attention of the salesmen the details of the new generating and distributing facilities of the company.

On Saturday evening, October 23, the third meeting of this kind was held, it having now become an annual feature of the sales department's activities. At this meeting some one hundred employees were present, including the entire sales force, several heads of departments and the officials of the company, as well as John W. Lieb, the vice-president of the New York Edison Company and a director of the United company.

At one o'clock in the afternoon the sales force left the general office, Irving Place and Fifteenth Street, in motor-busses on a tour of inspection. The first stop was made at the new Forty-fifth Street substation, now nearing completion. This station is an attractive three-story and basement building of terra cotta and red brick designed to harmonize with the residential character of this thoroughfare. From this point the busses went to

the new generating station, a number of the large and important new buildings connected to the company's lines during the past two years being inspected en route. Arriving at the generating plant the party was met by competent guides and a thorough and painstaking inspection of the plant was made.

After inspecting other properties of the company the party returned to the Hotel Martinique, where a dinner-meeting was held. Frank W. Smith, vice-president of the company, who spoke at this meeting, reviewed the work of the sales department during the recent campaign for new business and described in some detail the new construction work that has been carried on by the company during the past year. He outlined one or two interesting features of the Forty-fifth Street substation, pointing out that the ultimate capacity of the station would be 10,000 kilowatts. He stated that the current would be supplied from the station in about a week's time and that the ultimate lay-out provided for five incoming high-tension feeders from the generating plant and nineteen outgoing distribution lines or 3,000-volt feeders to the general network of the territory.

Mr. Smith called attention to the fact that special care had been taken to avoid any noise or vibration as the result of the operation of this substation and although it was strictly a static transformer station the company had left nothing undone to conserve the interests of the surrounding neighborhood. The building is completely isolated from the adjoining buildings on the east and west, the automatic regulators, condensers, etc., are insulated from their foundations by alternating steel and cork disks built up to a height of about one inch. Mr. Smith pointed out that with the completion of this substation Manhattan Island would be served by the United Company from four substations. In concluding, Mr. Smith made the point that with the growth of the company's business, the individual responsibility of every employee from office-boy to president, became greater. On this point he said, "Time was when in the recollection of many of us who have been identified with the company for a considerable number of years, we were personally acquainted with a large number of the customers of the company. In this way it was possible for us personally to come in contact with most of our customers and to do our part in keeping them satisfied. With the growth of the business and the greatly increased number of consumers this personal contact is divided among a number of employees, with each one of whom I would leave this thought—the impression which you individually create upon the mind of a prospective or existing customer is to a very large extent the impression which that customer will have of your company and therefore I say that the responsibilities of each employee have greatly increased, as the business grows and expands."

General View of Exhibit of the Commonwealth Edison Company at the Home Exposition, Coliseum, Chicago.

Joint Exhibit of Edison Company and Federal Sign System (Electric) in Which Various Household Appliances Were Shown.

The Old and the New in the Household.

In planning the exhibit of the Commwealth Edison Company at the Home Exposition at the Coliseum, Chicago, held on October 20 to 30, inclusive, the guiding idea was to contrast the old laborious ways of doing housework or giving household service with the modern electrical methods.

There was an old spinning wheel operated by a young lady in the costume of a Colonial dame, and near it was a modern electrically driven sewing machine. There was an old-fashioned wash tub and wash board with a colored "mammy" of ample proportions in charge. Close at hand were an up-to-date electric washing machine and an electrically driven wringer. An old worn-out broom was contrasted with the sanitary electrically driven vacuum cleaner of the present day. And so on.

Extending along the northern end of the exhibit hall, the space of the Commonwealth Edison Company was divided into five sections. Over the whole exhibit was a conspicuous flashing electric sign displaying the words "Edison Service." One of the five "rooms" was equipped by the Edison Company in conjunction with the Federal Sign System (Electric). This served as the "laundry" of the five-room household, and contained washing and ironing machines, vacuum cleaners and other household appliances.

The center room, with rugs and dignified furniture, was fitted very attractively as a music room. It contained a modern Telektra player piano, and contrasted with this was an old-fashioned square piano of the Civil War period. This room contained a handsome mantelpiece, having beneath it a unique electric fire "log" imported from Germany.

Other rooms contained portable and other electric lamps, electric heating and cooking utensils, an electrically cooled refrigerator, electric stoves, flatirons, etc. Various styles of fixtures were suspended from the ceilings of the different rooms. Electrically cooked waffles and other delicacies were distributed to the visitors to the Exposition.

One feature was an exhibit illustrating the progress of lighting units from the old tallow dip to the modern tungsten lamp.

Dana H. Howard, W. P. Lyon and H. H. Forrer, of the Commonwealth Edison Company, planned and installed the "Old and New" display.

Electrical Construction

By-Laws of California Association.

The California Association of Electrical Contractors and Dealers has been doing pioneer work on the adjustment of the relations of its own membership with other branches of the electrical industry in such a way as to make possible co-operation for the good of all. The workings of this organization have been watched with interest in all parts of the country, and it is believed that the rules under which it operates will be of interest to other similar organizations. The by-laws of the Association, as adopted May 27, 1914, are consequently given below, with the omission of those sections of a stereotyped nature, which would be of little or no interest.

Sec. 1. The name of this Association shall be California Association of Electrical Contractors and Dealers.

Sec. 2. Its objects are to promote the welfare of its members and to distribute among them the fullest information obtainable in regard to all matters affecting the business of the electrical contractor and dealer.

To encourage its members in establishing attractive retail stores where the consumer may obtain his requirements of electrical material.

To aid in bringing about a more friendly relation between electrical contractors and dealers, and to promote home industry by co-operating with manufacturers and wholesalers, who maintain stocks and organizations in the territory of its members.

To assist in standardizing and marketing high grade electrical merchandise of American manufacture, and by encouraging the proper installation reduce the fire hazard by co-operating with the National Fire Protection Association, the Board of Fire Underwriters of the Pacific and local municipal electrical inspection departments.

To improve the standard of specification by co-operating with the American Institute of Electrical Engineers and local chapters of the American Institute of Architects, and by closest co-operation with the central stations, assist them in solving the problems which will improve the service to the consumer.

To encourage the more general use of electrical appliances by encouraging its members to affiliate with and support the work of the Co-operative Electrical Development Society.

To encourage and support local Electrical Development Societies and Jovian Lunch Clubs.

Sec. 6. Any individual, firm or corporation in California engaged exclusively in the business of an electrical contractor, or dealer, may become a regular member.

Sec. 7. Associate membership shall be divided into two classes, namely, "A" and "B."

Class "A" membership shall comprise all central stations, telephone companies and electric railway companies and companies of like character.

Class "B" membership shall comprise any individual, firm or corporation, except those qualified as regular or Class "A" Associate members engaged in any branch of the electrical business, but who do not do installation work, and also any retailer handling electrical material, but not engaged exclusively in the handling of the same, and also any electrical dealer or contractor coming within the division of a regular member, but operating in a territory outside of the state of California, and also electrical engineers.

Sec. 8. For the purpose of determining whether an individual, firm or corporation is engaged in the business of electrical contractor or dealer, the following definition shall be used:

An electrical contractor or dealer shall be any individual, firm or corporation carrying a general stock of electrical supplies, or who may be prepared to make electrical installations.

He shall have an established location where he transacts his business with the public, and must have displayed any ordinary sign or placard announcing the character of his business, and shall maintain the usual set of books and records incident to the conduct of any ordinary business.

He shall carry a stock of electrical supplies of not less than $250, and shall have a full equipment of tools necessary for the performing of electrical installation work.

But the Executive Committee, by the concurrent vote of not less than two-thirds thereof, may admit to membership any electrical contractor or dealer, who does not qualify in all respects, under the above definition.

Sec. 9. The membership shall stand in the name of an individual as representing the person, firm or corporation, and the secretary shall recognize such person as authorized to represent as a member such person, firm or corporation, with power to vote at meetings.

Each individual, firm or corporation shall be entitled to name, in addition to the representative in whose name its membership shall stand, an alternate, but no individual firm or corporation shall change its representative, or alternate, during any fiscal year of the Association, except with the approval and consent of two-thirds of the members present at any general meeting, or two-thirds of the Executive Committee present at an executive meeting.

Sec. 10. A Membership Committee shall pass on all applications for membership.

The Membership Committee shall comprise not less than five members inclusive of the president, a vice-president and three members at large in the city or territory from which application originates.

The members at large shall be appointed by the president when applications are received.

Any applicant who receives a majority vote of the Membership Committee shall be declared duly elected. If the applicant does not receive a majority vote of the Membership Committee, it shall be the duty of the secretary to submit the application at the first regular meeting following of the Association. Application will then be submitted to the members at large, together with a full report from the secretary, giving the result of the votes of the Membership Committee.

If the applicant receives a two-thirds vote of members voting at any regular session, he shall be declared duly elected.

Sec. 12. The initiation fee shall be $10 and the annual dues shall be $30. The dues shall be paid quarterly in advance on the first day of January, April, July and October.

If, however, any member remits for his dues within 30 days after due date for the fiscal year he shall be entitled to a discount of 20 per cent.

Every member shall pay dues for the quarter during which he is elected as follows: If elected during the first month of such quarter he shall pay full dues for such quarter; if elected during the second month of such quarter, he shall pay two-thirds of such dues; and if elected during the last month of such quarter, he shall pay one-third of such dues.

Sec. 13. The initiation fee for Class "A" members shall be $10 and the annual dues shall be $30.

The initiation fee for Class "B" members shall be $5 and the annual dues $12.

Any regular member operating a branch house shall pay additional dues for said branch equal to 50 per cent of the dues of any regular member and subject to the same discount. For the purpose of determining what is a branch house, the following definition shall apply: A branch house shall comprise an establishment operating as is defined in the definition of a regular member, provided, however, that said branch is operated under the identical name of the main house. If, however, the name of the branch differs in any way from the name of the main house it shall be constituted as separate membership. Nothing in this definition shall be construed as meaning that a branch shall be defined where a regular member establishes a temporary office in another location for the purpose of making individual installations.

Class "A" Associate membership entitles the said Class "A" Associate member to nominate one representative and one alternate who may attend all meetings of the Association and receive all literature distributed.

Class "A" members may appoint additional representatives, who will have the privilege of attending all meetings and receive all literature distributed by the Association upon the payment of $1 per year for each additional representative so named.

Associate members shall be entitled to attend all meetings of the Association and receive all literature distributed, but shall not, however, be entitled to vote.

Sec. 14. Upon majority vote of the Executive Committee, initiation fee may be suspended or reduced for a period not exceeding any one quarter, and in the event of the reduction of the intiation fee, the Executive Committee shall determine amount of initiation fee during quarter so affected.

Sec. 15. Any member may be expelled from the Association for nonpayment of dues, after a period of 90 days from the date when the said dues become due and payable.

The membership of any member suspended as aforesaid who fails to pay such dues within 90 days after suspension, shall, as a result of such failure and without further action in the premises, terminate, unless said period of 90 days be extended by the Executive Committee, in which case his membership shall without further action terminate at the end of the extended period.

Sec. 16. Subject to instructions given by resolutions passed in general meeting, the management of the Association's affairs shall be vested in the Executive Committee.

In the absence of instructions on any subject, the said Executive Committee shall have power to act at its discretion, but its action shall be subject to the subsequent alteration, amendment or repeal by the members present at any subsequent general meeting.

Sec. 17. The officers of the Association shall be a President, elected by ballot at the annual meeting of the Association, as many Vice-Presidents as there are territories, elected as hereinafter specified, and a Secretary-Treasurer, who shall be chosen by the Executive Committee, as hereinafter specified.

Sec. 18. The Executive Committee shall be comprised of the President, Vice-Presidents from each territory, elected as hereinafter specified, and the Secretary-Treasurer.

Individuals representing only regular members shall be qualified to act as members of the Executive Committee.

In the event that it is impossible for any member of the Executive Committee to attend any meeting of such committee, the secretary may appoint a substitute located in the same district as such member to attend in his place.

A temporary committee shall be appointed by the Executive Committee, who shall divide the state into districts and each district shall be entitled to one representative. Thereafter the Executive Committee may, upon two-thirds vote, make any changes which they may deem advisable for the subdivision of territory for the purpose of apportioning the territory from which members of the Executive Committee may be elected.

Sec. 19. As many Vice-Presidents as there are districts shall be elected by ballot at the annual meeting, and shall hold office for one year, or until the election and qualification of their respective successors.

The members to be voted on for Vice-presidents representing particular districts shall be chosen as follows:

The members located in each district shall, five days previous to the annual meeting, send to the secretary of the Association for election as a Vice-President, the names of one or more members, but not more than three, located in their district, which names shall be submitted for vote at the annual meeting, and the member for whom the highest number of votes are cast shall be declared elected Vice-President for such district.

The members in each district may determine in any manner they may deem best, the name or names to be submitted for Vice-President.

Sec. 20. The Executive Committee shall have the power to appoint such sub-committees as it may from time to time deem necessary.

Sec. 21. The entire state will be divided into — districts to be numbered from 1 up.

The above described districts may be altered in number, size or description at any time by a majority vote of the Executive Committee.

Sec. 22. The General Secretary shall be chosen by the Executive Committee, and his compensation shall be fixed by such committee. He shall keep the books of the Association and shall perform such duties as may be delegated to him by the Executive Committee.

Sec. 23. Where it is deemed advisable to establish district officers of the Association, the members of all such districts to be covered by such branch office may select an assistant secretary, who shall be subject to the orders of the Executive Committee and of the General Secretary.

The salaries of the District Secretaries shall be fixed by the Executive Committee.

Sec. 24. The Secretary of the Association shall act as the Treasurer. He shall be custodian of Association funds subject to the control of the Finance Committee. He shall deposit such funds with banks or trust companies approved by the Executive Committee and shall file with each of such banks and trust companies a copy certified by the Secretary, of Section 24, of these by-laws.

He shall furnish a bond in an amount to be determined by the Executive Committee and the expense of such bond shall be borne by the Association.

The Executive Committee shall employ a certified public accountant who shall at least quarterly audit the accounts of the Treasurer and the Secretary. Such public accountant will file a written report of his investigation with the President and such reports shall be read at the next regular meeting following.

The Executive Committee shall appoint a committee of five, of which the president and secretary-treasurer shall be members, to have control of and to direct the disposition of the funds of the Association. No limitation shall be placed upon said committee's power to draw on and invest the said funds. The action of this committee must have the consent and approval of a majority of its members.

Sec. 25. The Association shall hold a general meeting at least once in every ninety days at such time and place as may be determined by a majority vote of members under the following conditions:

Of the four quarterly meetings, two shall be held in the territory north of the thirty-fifth meridian, and two shall be held in the territory south of the thirty-fifth meridian. For the purpose of deciding the place of meeting, all members in the territory north of the thirty-fifth meridian shall be entitled to vote when the quarterly meeting is scheduled in their territory. All members in the territory south of the thirty-fifth meridian shall be entitled to vote when the quarterly meeting is scheduled in their territory. The meetings shall be so arranged as to alternate in the territory north and south of the thirty-fifth meridian.

The time and place of the quarterly meeting shall be decided at each preceding meeting of the respective territory.

Sec. 26. The Executive Committee shall designate one of the quarterly meetings as the annual meeting, provided, however, that annual meetings shall be held alternately in the territory north and south of the thirty-fifth meridian.

Sec. 27. Meetings of the Executive Committee shall be held upon request of five of its members or upon the call of the president or secretary at such time and place as may be designated by them or him.

Sec. 28. Any action taken in any quarterly meeting shall be subject to ratification by the members at large.

Immediately following each quarterly meeting, the secretary shall forward to each member copies of the minutes of said quarterly meeting with which shall be enclosed returned postal card upon which the member may express his approval or disapproval of any or all action taken at the meeting. Any member failing to reply within thirty days after date such notification is sent out, shall be considered as having approved of same, and upon a majority approval, any action taken at a quarterly meeting shall be considered as final. If the majority vote is unfavorable, it shall be considered as if no action had been taken at the quarterly meeting and it shall be the duty of the secretary to notify all members.

Sec. 32. A vote on any question by any member of any body or committee may be taken by mail or telegraph and such votes shall have the same force and effect as though given at a duly convened meeting.

Sec. 33. If at any future date two-thirds of the total membership of the Association shall reside in the territory either north or south of the thirty-fifth meridian, all sections of these by-laws that refer to majority vote, shall automatically be changed to two-thirds vote, and the secretary must consider all decisions taken by vote on this basis.

Sec. 34. There shall be nominated by the regular membership in each territory, from the regular members, a vice-president, provided, however, that where the total regular membership in any territory is more than twenty-five, an additional vice-president shall be nominated for each additional twenty-five regular members or fraction thereof.

Sec. 36. The president shall be entitled to an expense allowance not to exceed $25 per month and the treasurer is empowered to pay such an amount monthly to the president.

Sec. 37. The Executive Committee

shall elect annually as counsel, a regular practicing attorney, prescribe duties and determine his compensation.

Sec. 38. Resignations shall be addressed and sent to the secretary and shall be thereafter acted upon at the next meeting of the Executive Committe and the member resigning shall be amenable to all rules and regulations of the Association to the date of such meeting.

Sec. 39. By a two-thirds vote of the entire Executive Committee, any member may be expelled for cause, provided, however, that such member is given an opportunity to be heard before the said committee. On the question of such expulsions neither the accusing nor the accused member shall be entitled to vote.

Sec. 40. These by-laws may be revised and amended at any general meeting.

A paper entitled "Co-operation Between Electrical Contractors and Jobbers—What It Means to You," which was drawn up by a joint committee of contractors and jobbers, has also been adopted as a part of the by-laws, since it contains the recognized principles of the members of the Association. This paper follows:

Co-operation Between Electrical Contractors and Jobbers.

It is a recognized fact that certain branches of the electrical industry are today in a very demoralized condition. As this is due largely to lack of proper co-operative effort on the part of the different branches of the industry, it is the belief of the committee that, with a proper organization whose primary interest is to educate its members to a greater responsibility, much good can be done in the way of properly serving the consumer and of creating a desire on his part to use electrical appliances and to adopt the idea, "Do it electrically," the slogan of "The Society for Electrical Development."

As examples of what can be accomplished we only have to review the work of Improvement Clubs, Societies, Chambers of Commerce and similar organizations throughout the country. Could individuals in the same period of time have brought about the reforms and changes in business methods that these associations have accomplished for their membership? The Panama-Pacific Exposition is an evidence of co-operative association team work.

The central stations, through their strong organization, the National Electric Light Association, have brought the lighting and power industry to a high degree of development, and, while doing so, have reduced rates to the consumer—neither of which could possibly have been accomplished through individual effort.

Electrical engineers, through the American Institute of Electrical Engineers, have been better prepared for their work through fuller knowledge of the requirements to be met and of the means of fulfilling them. This Institute is conducted purely for educational purposes and without individual profit to its members, except in so far as they improve themselves by participating in the work.

Electrical manufacturers and jobbers, through co-operative work, have done much toward educating themselves and as a result have placed their businesses on a firmer, more economical and more satisfactory basis. It has been proved through this work that, notwithstanding the increased cost of living and the consequent increase in the cost of almost every known commodity, the cost of electrical appliances has been steadily reduced and the quality of the articles steadily improved. The principal effort on the part of these industries has been toward educating their members to the necessity of efficiency in order that the various branches may operate their particular businesses at a minimum of expense.

Architects have the American Institute of Architects as their national association. We would hardly recognize as progressive an architect who is not a member of this Institute.

Some of his most valuable information is obtained through such membership and through his affiliation with other architects in association work.

While undoubtedly electrical products have made more rapid strides in the last ten years than any other industry, the building industry, generally, has kept apace with the times.

It is the belief of the committee, however, and it will be admitted by architects generally, that, while satisfactory progress has been made in the building industry, at least from an architectural standpoint, the electrical equipment in buildings of all classes has been steadily neglected, and it is common practice today, among many architects, to use electrical specifications which have been regarded by the electrical industry for a long time past as obsolete.

San Francisco today is an evidence of this. It has been almost entirely rebuilt within a period of seven years, and yet probably more than 95 per cent of the buildings erected in that period prove conclusively that the electrical specifications (and the ultimate installation) were neglected by architects generally. Of the remaining 5 per cent probably not more than 25 per cent, or 1.25 per cent of the whole, have been equipped with modern electrical installations, and in making this estimate, all classes of buildings have been taken into consideration.

Very recently certain firms of architects in San Francisco have engaged competent electrical engineers to prepare for them suitable specifications, but, notwithstanding, the engineer is handicapped in the preparation of specifications on account of the small proportion of the total cost of the building allowed him as his share. This condition is, of course, a direct reflection on the individual or firm of architects making the allowances.

The occupant of any commercial type of building, hotel, apartment house, flat, bungalow, or private home generally realizes only too late that no provision has been made for the many electrical conveniences. Many attempts have been made on the part of electrical people to assist architects in the drawing of proper specifications, but they invariably receive no encouragement, as certain architects really believe that they have forgotten more about proper electrical installations than all the electrical men in the country ever knew, and for this one reason they are impossible to approach.

They make no distinction between the reputable and the irresponsible electrical contractor. Their one idea seems to be to let the electrical contract simply on price. The result is evident:

Original cost of installation.....100%
Extra before occupancy of building 25%
Extra after building is complete.. 50%

And the installation is still incomplete. An additional allowance, in the first place, would undoubtedly have provided a better installation with less cost to the owner.

Electrical contractors have their national and state associations, which have done much to educate their members in the proper conduct of their business, and through their local meetings and state conventions have made possible an exchange of ideas that has tended to elevate the standard of work.

Notwithstanding the great results that have been accomplished by the Association, there are many electrical contractors who have failed to recognize the advantages to be gained by such Association effort. This is evidenced by the present state of the electrical contracting business.

In the past, when a contractor has been approached and the suggestion offered that he become a member of the Association, he has immediately asked: "What am I to gain by joining it?" The answer to this question is that he gets out in proportion to what he puts in. Having put in nothing in the past, nothing is what he has gotten out.

It is the belief of the committee that an electrical contractor unattached is unable to keep apace with the progress of the industry, and, consequently, is unable to properly serve his customers.

If he will become a member of the Association and will give it his support, it would be impossible to esti-

mate the benefits he will derive from it, as evidenced by the results of association work in other lines of endeavor, whether commercial or political.

As we have shown above that a competent architect should of necessity be a member of the American Institute of Architects or in some way affiliated with its local chapters, so it is clear that an electrical contractor should for the same reason be a member of some association which represents his craft.

It is fully recognized that the economic and proper channel of distribution of electrical supplies is through the electrical supply jobber to the dealer and contractor, who, in turn, serves the consumer. By this method the dealer and contractor is enabled to have the advantage of a complete stock of electrical merchandise in the warehouse of the jobber, which can be drawn on at any time, no matter whether it is one item or a hundred, and can be assured of prompt shipments and satisfactory service from every standpoint.

The jobber makes it his business to keep in close personal contact with the dealer and contractor in his territory, studies his wants, and plans to serve his needs, no matter what they may be. Through frequent calls of his salesmen he is often enabled to give valuable information, keeping him advised of the new lines of standard goods on the market, and furnishing technical data or giving such other information as may be useful from time to time.

He is frequently able to be of service by carrying his contractor or dealer, who has been tied up financially on account of delays in jobs over which he has had no control.

This kind of service cannot be had where the contractors and dealers do business at long range, and with people who are not in close touch or sympathy with their conditions or problems.

The dealer and contractor is the natural channel for distributing various electrical devices to the consuming public. He carries the material in stock and displays it on his counters and in his show windows. The consumer is thus enabled to see the material which he is purchasing, and knows that he is getting full value for his money. He can get promptly any information he needs or instructions in the use of the various electrical devices, which is a service that could not be rendered satisfactorily by correspondence with some distant point.

The object of this joint committee is to promote the use of electrical appliances and to influence the public to adopt the idea: "Do it electrically."

The co-operation of the central station in each district is highly desirable, and a closer relationship with the architects and those engaged in the industry must be maintained. In the past, the industry has failed to provide suitable show rooms, at which the consumer can obtain electrical appliances, therefore we will encourage the establishing of proper stores where material can be obtained at retail.

To accomplish this end, a campaign of education is about to be instituted. It provides for visits by the committee to all parts of the state, where public lectures will be given, supplemented by motion pictures, stereopticon views and working demonstrations of electrical appliances.

In order to gain the full confidence of the public in the industry we represent, the class of material furnished and the excellence of workmanship in its installation must be of the highest order. We should never recommend for sale an article in which we have not absolute confidence, and a full knowledge of the functions it will be called upon to perform.

We should not consider an installation as tending to promote the best interests of the industry, unless it has met with the unqualified conviction on the part of the contractor that it is of the highest class. An installation made by an electrical contractor, simply because it will pass inspection, is undoubtedly bad practice.

We recognize that, in our business, probably more than in any other, the public is woefully ignorant of the quality and merits of electrical devices. Whether or not they are satisfied depends upon how we serve them. We should recognize that the National Electrical Code, while having accomplished a great good, does not to the fullest extent accomplish the desired results, for the reason that it does not distinguish between standards of material.

We will advocate the grading of material by the National Fire Protection Association.

We recognize that local inspection bureaus are not responsible for installations in compliance with architects' specifications.

We will advocate the employment of one or more competent electrical engineers, whose duty it will be to furnish architects with certificates, certifying that work has been performed in accordance with the specifications embodied in the contract.

Work may be performed which in every respect meets the requirements not only of the National Fire Protection Association, but local, state or municipal inspection bureaus, which is not a credit to the electrical industry. We are opposed to electrical contractors, who, after executing a contract, endeavor to substitute materials of lower grade. We advocate that the various Electrical Contractors' Associations should assume the responsibility for seeing that their members perform work in accordance with specifications without attempting to evade their contract in any detail.

We believe that with proper co-operation on the part of the architect and other allied interests, the various State Associations of Electrical Contractors will ultimately be able to guarantee on behalf of their members the completion of any contract entered into.

We will ascertain the names of all societies of architects, times and places of meeting, and will endeavor to have representative electrical engineers, as well as members of our joint committee, appear before these associations to explain the necessity of not only the proper drawing of, but also the compliance with recognized modern specifications.

Caution should constantly be exercised to see that only those contractors are admitted to membership of an association whose character and honesty are unquestioned, and who have an established reputation for square dealing.

Among the Contractors.

Sayre & Record Electrical Company, Weiser, Idaho, recently took over the business of the Burns Electrical Company, of that city. The affairs of the company will be conducted in the same place on West Idaho Street.

M. C. Melton, of Henderson, Ky., has purchased the plant and business of the Seiffert Electric Company, and will continue it under the name of the Melton Electric Company.

Having a big billboard advertisement in each of two corners of the State Capitol grounds, in the busiest part of town, is the privilege being enjoyed by the Sackett Mine Supply Company, Columbus, O. This company is electrical contractor for two comfort stations, one for each sex, at some considerable distance apart, on the grounds in question. These improvements will be beneath the surface, and of the most modern type, reached from the street by short flights of stairs. The electrical work includes wiring for lighting and for ventilating fans, the installation of about 30 lamps for the interior of each station and outside standard lamps.

The Ackerman Electric Company, Grand Rapids, Mich., will build a shop, 22 by 36 feet, on Pine Street.

The Devere Electric Company, Cincinnati, O., will handle all electrical work on the new Children's Home buildings in Madisonville.

National Association of Electrical Inspectors.

HUBERT S. WYNKOOP, President, 1574 Fiftieth Street, Brooklyn, N. Y.
WASHINGTON DEVEREUX, Vice-President, 131 South Fourth Street, Philadelphia, Pa.
WILLIAM LINCOLN SMITH, Secretary and Treasurer, Concord, Mass.
R. P. STRONG, Representative on Electrical Committee of National Fire Protection Association, 809 Hibernian Bank Building, New Orleans, La.

Executive Committee
J. C. FORSYTH, Chairman, 123 William Street, New York City.

SECTION REPRESENTATIVES:
C. H. Fletcher, George Hubbard, British Columbia.
A. W. Hopkins, G. W. Perry, Western New England.
Washington Devereux, A. H. Lilley, Philadelphia.
E. N. Davis, H. A. Knight, Eastern Massachusetts.
M. L. Pomares, O. E. Smith, New York City.
Arthur Kempston, G. A. Cleary, California.

MEMBERS AT LARGE:
K. W. Adkins, St. Louis, Mo.
Emil Anderson, Minneapolis, Minn.
F. G. Hartwell, Boston, Mass.
J. E. Latta, Chicago, Ill.
James B. McCarthy, Detroit, Mich.
H. G. Veit, Cleveland, O.

"LET THE CODE DECIDE."

Secretary's Message.

The Secretary desires to call the attention of members to the fact that at the moment of writing his desk is absolutely bare of material for the question department—either no work has been done anywhere during the summer, or else by some miracle no member has met with any circumstance which could not be settled with no chance for argument arising, or that was not so perfectly obvious to him that in his opinion it contained not the smallest interest for his brother inspectors!

However ideal, such a state of things would appear too good to be true and the alternative is simply that members are *not doing their share*. The Secretary cannot run this department alone and without material, being definitely restrained from supplying any original matter; *Ergo, it is up to you.*

Notes From the Sections.

The first meeting of the Western New England Section was held at the Weldon Hotel, Greenfield, Mass., on Wednesday, October 13 at 10:30 a. m. Two new members were elected:

W. H. Nichols, superintendent of wires, Bennington, Vt.; A. H. Keeney, inspector of wires, Holyoke, Mass.

A motion was passed that the plans for the January meeting be left with the Executive Committee.

F. L. Hunt, chief engineer of the Turners Falls Power and Electric Company, read a very instructive paper on Outdoor Substations.

At the close a vote of thanks was extended to Mr. Hunt, after which the paper was fully discussed. Lunch was served in the Hotel grill room at one o'clock, after which the officers of the Turners Falls Company transported the members to Turners Falls by automobile, where the new water-power development of the company was looked over and explained.

Four guests from Greenfield, one from Holyoke, one from Springfield and one from South Manchester, Conn., were present.

The first installment of Mr. Hunt's paper is published herewith. The conclusion will be printed in the next issue containing this department.

THE DEVELOPMENT AND OPERATION OF OUTDOOR SUBSTATIONS.[1]

By F. L. Hunt.

A good idea of the progress in the development of outdoor apparatus and substations may be had by referring to papers which have appeared during recent years in the *Proceedings* of the American Institute of Electrical Engineers on this subject.

Until about ten years ago, arc lamps and small distributing transformers up to a capacity of 50 kilowatts and up to a voltage of 2,300 volts were about the only pieces of electrical apparatus operated outdoors.

In 1907 a paper appeared by Ralph D. Mershon in the *Proceedings* in which he described the station and transmission lines of the Niagara, Lockport, and Ontario Power Company, and which description includes that of a substation at Lockport, N. Y., that had been put into operation in July, 1906. In this substation only a small start was made toward what we know as an outdoor substation at the present time. The only equipment placed outdoors was the buses, the lightning arresters and the selective disconnecting switches from the buses to the various transformers and circuits. The transformers themselves, the oil switches and the control switchboard were all placed inside the station. This substation is still in operation, and I had occasion to see it within the last few months. Its operation has been, for all practical purposes, quite successful.

The next step of advance may be noted in a paper by K. C. Randall, which appeared in the 1909 *Proceedings*. In the second paragraph of Mr. Randall's paper he says: "Thus far about 50 kilovolt-amperes has been the limiting capacity found in outdoor service, but there are a few exceptions. Outdoor transformers of 100 kilovolt-amperes capacity or greater for any voltage have been almost unknown. Recently, however, large transformers have been taken up and a few are in service, most of them but for a short time." He states further on that transformers for outdoor service may be built for any requirements that the ordinary indoor type of oil-insulated unit will satisfy, but that the limit of capacity is about 500 kilowatts for self-cooled transformers, although it was his opinion that water-cooled outdoor transformers could be built up to any capacity. His paper shows comparative layouts for indoor and outdoor stations to take care of the same conditions, and gives detailed estimates to show, for instance, that in the case of a 2,000-kilowatt, 25,000-volt, 60-cycle transformer station there was a saving of 30 per cent by using the outdoor type of construction, as against the indoor type, and that in a 3,000-kilowatt, 22,000-volt, 25-cycle transformer and motor-generator station supplying railway service, a saving of 13 per cent was to be obtained by using the outdoor construction; the smaller saving in the latter case being due, of course, to the larger percentage of indoor apparatus required, since the motor-generator sets required to obtain direct current for railway purposes had to be placed indoors. This paper also shows photographs and describes outdoor oil switches, current and potential transformers and electrolytic lightning arresters up to 60,000 volts.

In 1912, three years later, a paper by F. C. Green describes the development of outdoor substation work which had occurred since the paper of 1909 appeared, and shows that there had been manufactured, installed and put into operation during the period since the paper of 1909 more than 100 transformers having a total capacity of more than 60,000 kilowatts, ranging in capacities of individual units from 140 to 3,333 kilowatts, and ranging in primary voltage from 16,500 to 110,000 volts. This paper then goes on to deal with the various problems to be met in the design and manufacture of outdoor apparatus, especially transformers. This paper shows that the sizes and the voltages for which outdoor transformers and equipments were being built had increased very materially during the three years preceding 1912.

The next papers read before the Institute on the subject of outdoor substations appeared in the *Proceedings* for Febru-

1 Paper read before Western New England Section of National Association of Electrical Inspectors, Greenfield, October 13.

ary, 1914, when there were four papers; one describing susbtations in the Middle West, one in Pennsylvania, one in New England, and one entitled "Outdoor versus Indoor Substations," which discussed the subject in a general way. These papers brought out the fact that there are few large transmission companies at the present time which do not have more or less outdoor equipments and substations, and that there was in course of construction or operation at that time more than 300,000 kilowatts in high-tension outdoor-type transformers.

The increase in the use of such apparatus is also shown by the following figures giving the kilowatt capacity of outdoor transformers in units of 200 kilowatts and over, produced by one manufacturing company for each year since 1910.

Year	Kilowatts	Percentage of outdoor transformers over 200 kilowatts to total transformer apparatus
1910	500	2
1911	65000	5
1912	125000	8
1913	200000	15
1914	150000	20

The development and application of outdoor substations have been brought about by two conditions:

First, by the necessity of some such arrangement in order to serve small communities or small loads from high-tension transmission lines passing through the country. This has been especially true in the West, where lines of great length have been built and where they pass through small towns in which the cost of service, if supplied by an isolated plant, would be exorbitant, and where the amount of business available would not even support the investment necessary to build a substation large enough to house the high-voltage transformers and switching. Such communities may frequently be served profitably from a passing transmission line when outdoor transformers, lightning arresters and switching can be made use of. For instance, a typical station of this kind which is described in one of the papers mentioned above consists of one three-phase, 33,000-volt, 200-kilowatt, outdoor-type transformer set on a concrete foundation outdoors, inclosed by a wooden picket fence and fed from a transmission line passing directly over it through horn-gap lightning arresters and disconnecting switches, all placed on wooden poles.

This station feeds a small community, requires no attendant, is arranged with fuses so that trouble in the outdoor apparatus will automatically free itself from the transmission line, and all at a total investment of not more than $6.00 per kilowatt. The cost of a building alone to house the equipment would increase the total investment at this point more than 50 per cent.

A little-higher-grade outdoor substation which is used a great deal consists of transformers set on steel towers, so that the transformers are six or eight feet above the ground, and outdoor current and potential transformers may be installed on this same tower, which will supply current to a meter placed in an iron box, also mounted on the tower. Above the transformers on the top of the tower may be mounted necessary disconnecting switches and lightning arresters, so that all the elements of a substation are present and the installation is done in a very permanent and lasting manner. In such an installation as this, the lower part of the tower may sometimes be inclosed, and one or more separate feeder panels installed in the lower inclosure, so that more than one circuit may be fed and controlled from the secondaries of these transformers.

The second feature which has brought about the development of outdoor substations in larger capacities is probably the large amount of space that is required for any extensive switching arrangements on high-voltage circuits. A typical station of this kind may be seen at Millbury, Mass., where the Connecticut River Transmission Company has a switching station which is laid out to accommodate four 66,000-volt circuits and two 110,000-volt circuits, including a sufficient amount of switching so that energy may be brought into and out of this station from any one circuit to any other circuit, including the additional switching which is required to take care of the different voltages and the transformers from which the current is stepped up or down from one voltage to the other. It is not difficult to see that a building large enough to accommodate this arrangement of circuits, switching and transformers would be very expensive, whereas the whole arrangement can be laid out outdoors where the value of real estate is not great at a very reasonable cost.

There are in the West and South many outdoor stations operating at high voltages at the junction points in large transmission systems where power is fed in from a great many generating plants to one system.

Substations built by the Turners Falls Power & Electric Company on its circuits between Turners Falls and Springfield in the year of 1913 are also good examples of the larger-capacity outdoor substations. As these stations were designed and built under my charge, it is possible for me to give you a more detailed description of them, and I think such a description may be of interest to you.

One of these is located at Chicopee and one at Agawam, Mass., both being supplied from the company's double-circuit, 60-cycle, three-phase, 66,000-volt transmission line.

When these stations were being laid out, considerable attention was given to a study of the advantages and disadvantages of indoor and outdoor apparatus, the result of which was the adoption of what might be called a semi-outdoor substation in which all the 66,000-volt equipment, including the step-down transformers, was placed outdoors, as were also the aluminum lightning arresters on the 13,200-volt outgoing lines, while the 13,200-volt buses and switching, the control switchboard, the 2,300-volt distributing switchboard and the railway apparatus were placed inside.

The choice between indoor and outdoor apparatus in different parts of the equipment was based on the following considerations.

(1) The 66,000-volt apparatus was the most bulky part of the equipment, and therefore the greatest saving in building space could be accomplished by putting it outdoors.

(2) The more complicated switching necessary with the numerous 13,200-volt and 2,300-volt outgoing circuits and synchronous-motor circuits would have been much more difficult and expensive to handle in an outdoor installation. Hence, they were placed inside.

(3) The control switchboards, with their meters, instruments and storage battery, and the railway motor-generator sets have not at the present time been developed to the point where it is practical to operate them outdoors; therefore these were placed inside. Except in the case of the switchboards with their meters and instruments, the storage battery and the railway sets, none of which are suited to outdoor operation, the relative location of the remainder of the apparatus, that is, whether it would be placed indoors or outdoors, was determined principally by comparison of estimated first costs, since no well-founded objection to the use of outdoor aluminum lightning arresters, oil switches, transformers or buses could be found.

The saving in the first cost of the building may be arrived at very closely on the basis that the cost of two proposed buildings, erected on the same site, for the same purpose and of the same general design and material, will within reasonable limits, have first cost in the direct proportion to their cubic contents. A building, similar to the one actually erected, but of the dimensions necessary to accommodate indoors all the apparatus, including the 66,000-volt equipment, allowing for the same switching scheme, and providing a space for future expansion equal to that which is incorporated in the present station and outdoor foundations, would cost on the above basis 2.3 times the cost of the present building. After allowing for the extra cost of outdoor apparatus and the cost of outdoor foundations and steel structures, the saving in this case was an amount equal to 11 per cent of the cost of the complete station and equipment as built.

The general arrangement at the Chicopee substation, as it was built, was as follows. A tap circuit is brought in from each of the two transmission lines through choke coils, disconnecting switches, and solenoid-operated non-automatic oil switches to a transfer bus, from which the transformers are supplied through disconnecting switches and solenoid-operated automatic oil switches, one set for each bank. An aluminum lightning arrester is installed on each incoming line. At present there is one bank of three 1,500-kilowatt oil-cooled transformers of the radiator type in use here, with one spare unit, and foundations and conduits were installed for a second bank. This second bank is now on order and will consist of three 5,000-kilowatt water-cooled units of the same voltages as the first units. From the transformer bank one circuit is carried underground into the building to the 13,200-volt double bus in a concrete bus structure.

The arrangement, so far as outdoor station is concerned, is the same at Agawam, except that there is a difference in the capacity of transformers, and there are two circuits from the secondary side of the transformers into the building; one leading to the 13,200-volt bus, and one to the 2,300-volt bus, as power is distributed at both voltages from Agawam station.

The transformers and oil switches are connected by a complete piping system to a two-compartment oil tank buried in the ground, so that oil can be drained from any transformer or oil switch into its respective compartment of the oil tank, and from there can be pumped through a portable oil filter press back into the transformers or switches. Alarm thermometers on the transformers are connected to bells in the station.

When it becomes necessary to disassemble a transformer it is rolled on to a transfer truck upon which it is run into a compartment at one end of the station where a hoist is available of sufficient capacity to lift and remove the core.

Outdoor equipment may also be used in some cases in connection with generating stations. Where a considerable amount of switching at high voltage is necessary in a generating station, it will sometimes be found that the use of outdoor switching equipment and of transformers may show a considerable saving in the cost of the power house. It is the practice at the present time, especially in power houses, to place all high-voltage apparatus, such as large power transformers, oil switches, current and potential transformers for metering, lightning arresters and disconnecting switches on voltages of 33,000 volts or more, and in some cases on less voltages, in separate individual compartments. Such compartment construction is, of course, expensive, and when a great deal of this is required in order to place the apparatus indoors, the opportunity of a saving by putting this apparatus outdoors is almost certain to exist.

The design of each individual station will, of course, determine the necessity of the use of outdoor equipment. In a station designed similarly to the one which the Turners Falls Power & Electric Company is now building at Montague City, the space required for the high-tension transformers and switching was obtained at a very small additional investment, as this equipment was placed immediately over penstocks, which place would have been more or less vacant if it had not been used for this purpose, and the additional expense required to install the apparatus here did not amount to much more than the cost of building the roof over it.

The principal advantages of outdoor substations and equipment may be called attention to.

(1) *Less Cost.*—The saving in cost in various types has already been pointed out, and will amount in most cases, where it is advisable at all, to from 10 to 25 per cent.

(2) *Ease of Extension.*—This is a very decided advantage in the outdoor-substation arrangement, since it is ordinarily necessary in arranging high-tension apparatus in a building to build the structure considerably larger than the present requirements call for, in order not to greatly increase the expense of increasing the capacity of equipment. An outdoor substation may be laid out so that it can be extended indefinitely with an initial investment no greater than would be necessary if the building would never be extended, and with an investment required at each extension only proportional to the extension which is made at the time.

(3) *Fire Hazard.*—It is, of course, self-evident that the fire hazard is much less in outdoor substation, since there is much greater possibility of confining a fire to the particular piece of apparatus in trouble than when everything is confined inside a building.

(4) *Communication of Trouble.*—The various pieces of apparatus in an outdoor substation can be placed far enough apart so that the liability of trouble in one being communicated to another is very much reduced over that which exists in an indoor station.

The disadvantages which have been discussed more or less in connection with outdoor stations may be set down as follows.

(1) *Difficulty of Repairs.*—It is, of course, more difficult to make repairs on apparatus outdoors, especially in the case of bad weather although in most of the outdoor stations at the present time arrangements are made so that apparatus needing repairs can be taken under cover with little additional loss of time and the actual repairs necessary to transformers and switching equipment of high voltage and large capacity are becoming less and less frequent.

(2) *Operating Risks.*—This is offered as an objection in some cases, although in actual practice we have not been able to discover any risks which seemed any greater than those which occur in indoor stations.

(3) *Danger to Public.*—This disadvantage we believe can be entirely eliminated by properly inclosing the outdoor apparatus.

(4) *Appearance.*—We have to admit that the appearance of an outdoor substation is not particularly good from the standpoint of beauty but it is not likely that this is great enough disadvantage to stop the use of this style of construction where any great saving can be shown by using it.

(5) *Danger of Interference from Outsiders.*—This disadvantage can also be practically eliminated by properly inclosing the equipment installed out of doors.

(To be continued.)

Australian Electrical Trades Union.

According to an Australian newspaper, it was reported at the annual meeting of the Electrical Trades Union of New South Wales that there was a membership of 1,704. Despite the war, the financial year had been the most successful in the history of the Union. The Newcastle branch was on a sound footing, and had a membership of 90. In Sydney more than 350 positions had been filled direct from the union office. The union's relations with the main body of employers had been cordial throughout. Although cases had arisen in which it was found necessary to report breaches of awards, these had mostly occurred among the small irregular contractors and firms not primarily connected with the electrical industry. On the whole, trade had been unexpectedly good since August of last year. The falling-off in other directions had been largely counterbalanced by naval activity.

Electrically Propelled Coasting Vessel.

The Swedish vessel *Mjolner* is designed for electric propulsion. It is 225 feet long and has a displacement of 2,250 tons. The normal speed is 11 knots and 900 horsepower is required.

There are two Ljüngstrom double-rotation steam turbines driving alternators which deliver three-phase current to two motors driving a common helical spur on the propeller shaft. Each unit is rated at 400 kilowatts at 500 volts and 120 cycles. The turbine is 7,200, the motor speed 800 and the propeller speed 85 revolutions per minute. A saving in coal of 38 per cent over reciprocating engines is anticipated.

Public Service Commissions

Conducted by William J. Norton

NEW YORK—Second District.

Peoples Natural Gas Company. The franchise of the Natural Gas Company limited the price it could charge for gas to 25 cents per thousand cubic feet. The company showed, however, that for several years it had not been able to do a profitable or satisfactory business. The Commission issued an order permitting the company to increase its rates to 32 cents per thousand cubic feet, with a discount of two cents per thousand cubic feet on bills paid within ten days.

Judge Hodson in his opinion declares the principle that it is the duty of the Commission to conserve the interests of the company as to income and benefits, quite as much as it is to protect the rights of the public as to rates and service. "It would be a denial of justice to those who have made this utility a public convenience, to even permit them, much less to require them, under the circumstances, to continue the operation of this business without profit, and indeed at considerable loss. . . . The earnings of the company, in order to be reasonable, must be large enough to provide sufficient funds to pay all operating expenses and fixed charges, and to cover also such proper amounts for interest, profit and depreciation as can be regarded as fair under the circumstances of this case.

"Adequate prices which will yield a fair return upon the invested capital of the company, after providing for all such expenditures, are as necessary and proper as the day wages of a laborer or any other just compensation in the economy of business. This proposition is not always recognized by the public which sometimes makes unreasonable demands upon a public service corporation in order to gain some slight advantage in the matter of rates and service, which course often deprives the utility of a proper current income for the service rendered, and usually terminates in loss and inconvenience to all parties concerned."

The company, in presenting its case to the Commission, carried a resolution of the town authorities which agreed that the case should be considered without regard to the limitations on the price of gas contained in the franchise. Commissioner Hodson commends this action of the town authorities as "recognizing the principle that the company and the customers it serves have a mutual interest in the business and the good service by the company should be properly compensated by the customers in order to make such business remunerative to the company and a benefit to the people of the town, and that, by the same token, a blow at either would work serious injury to the other."

WISCONSIN.

The Bloomer Electric Light & Power Company asked for authority to put in effect special provisions respecting service to rural consumers, alleging that under the present rates the company could not afford to extend service to rural customers.

The Commission says: "The increasing demand for electric service from rural districts presents new problems for the electric utility. Chief among these are questions relating to the obligations of the company to serve such consumers, the duty to furnish service equipment, and the matter of rates chargeable for such service."

Before taking up the matter of rates, the Commission considers the question as to the obligation of the company to furnish equipment. In this connection the Commission says: "The question of line-extension cost, rather than the cost of other equipment, is the one variable factor in the situation. In order to work out a rate that is not discriminatory, it is necessary to eliminate as far as possible the variable factors. If the rural extensions were of uniform length, and it were found reasonable to require the company to install them, then an average rate would meet the situation. Since this is impossible, the elimination of line extensions seems necessary. This would mean that this cost should be borne by the consumers.

"Since a utility is bound to furnish service and since the consumer is under no obligation, save when under contract, to continue to use this service, it would seem unreasonable to expect the utility to install a long service line without an assurance of continued use. When the consumer must spend from $100 to $300 in the construction of his own line, it stands as an expression of probable continued use; otherwise, the investment of the consumer would be wasted.

"While it may be claimed that, in the event of discontinued service, the utility is in a better position to make use of the line material, it should still be remembered that the cost of salvaging such a line is not small, and that this cost, if loaded upon the reconstruction of the line for a new consumer, would bring the cost up to about that of a new service line, without securing the same prospective life as a new service would have.

"The question of revenues derivable from this service as determining the feasibility of requiring the company to install the service lines does not appear pertinent in this case, as equity to all consumers could not be done by establishing a uniform rate for rural service based on average costs.

"So far as line extension is concerned, then, the request of the petitioner that consumers shall furnish this part of the equipment is reasonable."

In regard to transformers and lightning arresters, the Commission says: "A utility is ordinarily bound to furnish safe and usable current. This principle holds, then, that the petitioner company should furnish transformers and lightning arresters. This is an expense that can be supported by the rates charged, and is distinguishable from the matter of extension of lines in that the investment required per consumer is much more standard and uniform than in the latter case. An adequate demand charge or minimum bill saves the utility from loss. The mere fact that the investment is somewhat larger than an urban consumer would require cannot constitute a sufficient reason for forcing the rural consumer to buy all of his own equipment. Rendering service of this kind in rural districts has hitherto been regarded by utilities in general too much as a favor extended to which their common law obligations did not attach. Where a utility has undertaken to supply a rural district, it must do so without discrimination, supplying the necessary equipment where this can reasonably be done. We have found that, in this case, the installations of rural services cannot reasonably be required of the company, but we cannot find that the company

should not be required to furnish transformers and protection devices."

With these matters settled, the Commission determines a proper minimum bill. "The minimum bill allowable can now be determined upon the basis of installation of equipment as is hitherto found reasonable. The following estimate shows about what the bare cost of supplying a consumer would be, without considering fixed charges on any portion of the transmission system or any part of the general expenses. The average investment by the company is assumed to be about $150 and the bare cost of current including line and transformer loss, to be two cents per kilowatt-hour.

Minimum Bill Estimate.

Interest, depreciation and taxes on average investment, 13 per cent on $150	$20.00
Reading meters	4.00
Current	6.00
Total	$30.00
Or, per month	2.50

"The additional cost to the consumer who has a service line a mile long, in lost interest and depreciated capital will be about as much more per month.

"The foregoing expense is based upon the assumption that lighting service only is taken. If two meters are installed and power service is also rendered, the fixed expenses per service are decreased proportionately. Inasmuch as these estimates must be based on assumptions of the amount of the connected loads, the results themselves can only be taken as indications or approximations. However, it would appear that if lighting service alone is taken, the minimum bill of $2.50 per month is reasonable; if power service alone is taken, the regular demand charge is reasonable, provided that a minimum of $2.50 per month is established; or if both services are taken, the minimum bill of $2.50 for lighting service should apply, with the minimum for power service based solely on the present demand charge of 75 cents per horsepower per month without stipulation as to minimum except that perhaps installations of less than one horsepower should be counted as one horsepower."

An order was issued in accordance with the above opinion.

Richland Telephone Company. The Commission, on its own motion, conducted an investigation of certain complaints regarding the company's rates, rules and regulations for telephone service. Certain complainants alleged discrimination in that a bank president and a doctor receive the service of a patented device known as an automaphone which is not furnished to other subscribers.

The Commission recommends that the company arrange for the change to a central-energy system as soon as its finances warrant such an improvement, and holds that unless the company is in a position to extend automaphone service to all of its subscribers who desire such service and are willing to pay a reasonable additional rental therefor, it should not install automaphones or permit the installations of automaphones by individuals. The Commission regards the existing situation as discriminatory, and requires that automaphone service be furnished to all who desire it without discrimination, or be entirely discontinued.

A number of the complaints brought before the Commission arose from the company's rule providing for the disconnection of service if the telephone rental is not paid on or before the fifteenth of the month.

The Commission says: "A telephone utility is required to render adequate service at reasonable rates, and in fixing such reasonable rates it is ordinarily assumed that all rentals will be paid and paid promptly. Under such circumstances it is entirely permissible for a utility to require payment in advance for a reasonable period. The experience of many telephone companies, whose financial status has been examined by the Commission, indicates that where payment is not required until after the service is rendered, many uncollectable bills are found on the books, resulting in a serious handicap in meeting current obligations. It being permissible to require prepayment of rentals, it follows that reasonable measures for securing prompt payment in advance are justified. In the present case the subscribers are notified in the printed directory that payment is due on the first of the month and is to be made prior to the fifteenth of the month in advance. The collecor makes one call prior to the tenth, and on the tenth notice is mailed to the subscriber enclosing a bill which specifically reminds him of the disconnection rule. It can scarcely be held unreasonable to require a patron to pay his rental within 15 days after it is due. If he does not wish to be annoyed with monthly statements and collections, the company will no doubt be glad to accept payment in advance for as long a period as the patron may designate. The existing rule should work no hardship on any subscriber if he meets his obligations with reasonable promptness."

Central-Station Output Figures.

Last year the total output of the 5,521 central electric stations in this country was 14,000,000,000 kilowatt-hours.

Electrical Exports for August.

The monthly summary of imports and exports of the United States for last August has been issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C. From this are obtained the following facts regarding the electrical exports during that month.

Although the electrical total is below that of July, it exceeds that of August, 1914, by nearly 80 per cent. The latter month, however, was the first month of the European war when all international commerce was very seriously curtailed. For the four classes for which the number of articles exported is given in the government report, there were shipped last August the following: electric fans, 1,112; arc lamps, 75; carbon-filament lamps, 140,282; metal filament lamps, 461,580.

The following table gives the detailed figures for the electrical classes reported:

Articles.	August, 1915.	August, 1914.
Batteries	$ 114,516	$ 38,722
Dynamos or generators	216,906	114,570
Fans	15,453	5,528
Insulated wire and cables	251,083	51,236
Interior wiring supplies, etc. (including fixtures	49,202	43,511
Lamps—		
Arc	1,633	1,620
Carbon-filament	17,221	4,338
Metal-filament	74,119	9,592
Meters and other measuring instruments	57,244	23,747
Motors	277,940	118,490
Telegraph instruments (including wireless apparatus)	17,030	3,101
Telephones	50,841	78,403
Transformers	29,146	33,609
All other	633,958	497,543
Total	$1,806,292	$1,024,010

The total value of all electrical exports for the first eight months of 1915 was $14,977,440, compared with $13,654,569 during the corresponding months of 1914, and $18,949,235 for 1913.

New Concern Organized to Give Battery Service in Salt Lake City.

The Electric Truck Service Company has been organized in Salt Lake City, with A. O. Whitmore as its president, to furnish electric batteries and electric battery service for electric trucks in operation in the city. Mr. Whitmore has maintained an agency and garage for electric pleasure vehicles for the past several years. George B. Turner, for several years past identified with the automobile industry, is manager of the new concern. The company has leased and remodeled for use as a garage the large building on Second East Street between South Temple and First South formerly used by the Utah Light and Railway Company as a car-barn. While several central stations have inaugurated battery service for trucks it is believed that the Electric Truck Service Company is the first one independent of a central station to adopt this policy.

THE FUTURE OF WATER-POWER DEVELOPMENT IN ALABAMA.[1]

By Thomas W. Martin.

Of all the natural resources which abound so profusely in Alabama, there is none that promises so much for the development of the state at this time as does the proposed water-power development of the Tennessee, Coosa and Tallapoosa Rivers. The state of Alabama has reached a point in its industrial progress where plants must be built with which to convert crude material into finished products for the markets of the world, and the water-power developments will afford the dual purpose of supplying the power which may be used at the present day in almost every branch of manufacture, and at the same time enable navigable waterways to be opened to the coast.

Prior to 1830 the government of the United States took cognizance of the Tennessee and Coosa Rivers looking to their development, and from time to time large sums of money have been spent by the United States with that end principally in view. The many rocky shoals in those rivers, as well as their flashy nature, make it now impracticable to proceed with a development, such as the United States originally proposed, consisting of a number of small dams creating slack-water pools of shallow depth. To meet this condition the modern school of thought has developed the plan of increasing the height of dams, creating larger pools and utilizing the water not only for the purposes of navigation but for the equally important purpose of the development of electric energy. The engineers of the United States have comprehended in a broad and thorough way the possibilities of co-ordinating commerce and industry in the development of the rivers of this state, and be it said to their credit that if they had received the support of the Congress of the United States far greater progress would have been made on this subject in almost every part of the country. At the present time there is one large development recently completed by the Alabama Power Company on the Coosa River in Alabama at Lock 12, being the site selected some years ago by the engineers of the United States for the location of one of the navigation dams upon that river. This one development today is supplying the power and lighting needs of the great industrial section of Alabama, as well as a number of cities and towns, and the plant is not completely loaded. At the same time, a stretch of the Coosa River of some twenty miles in length has been opened to navigation. This result, however, was accomplished by the Alabama Power Company after many difficulties were surmounted, both physical and financial, and the power is now being sold at an extremely low rate on account of the cheapness of coal and the potential competition from the steel companies and by-product furnaces.

The future of such developments lies entirely with the public. The state of Alabama many years ago placed upon the statute books a system of laws having the definite purpose of encouraging the development of the water-power resources of the state. This was in pursuance of a demand on the part of the public that the power of the streams, which has been going to waste all the years, should be turned to a useful purpose. The laws of the state may therefore be said to be ample for this purpose, and tend to encourage such developments. The great water powers of the state are with few exceptions located on navigable streams; and even other streams, such as the Tallapoosa and Little Rivers, empty into navigable rivers; and it is the policy of the Federal Government to assert control not only over the navigable rivers but the streams leading into them, and therefore developments which might be made on the non-navigable streams of the state are seriously affected by the possibility of federal control.

There has been no important action by Congress in the aid of water-power developments since 1907. Prior to that time a number of developments had been authorized under government permits, which were revocable at the will of the government. However, those who made the developments proceeded upon the theory that their investments would be protected if made in good faith, but notwithstanding this sound principle a large number of permits were some years ago arbitrarily revoked by the Secretary of the Interior, although the permittees had not violated any law or regulation; and at this time a large number of ejectment suits are pending in the United States courts which, if successful, will in effect confiscate about one hundred million dollars' worth of property, the most of which was built on the assumption that government permits were secure. Those who have taken up and followed the so-called Pinchot idea of conservation have insisted upon the same principle in every water-power bill that has been proposed in Congress and as a result no dams have been built under any general legislation since 1907; and it is safe to say that in the light of the experience of those who have invested on the faith of federal permits which were revoked, none will be made until a sound, stable and conservative law is enacted by Congress which shall fix with certainty the status of developments made on the faith of laws. It may be argued that those who desire to make the developments have insisted upon conditions and terms which were not fair to the public, but such is not the case, and those who have followed the subject in and out of Congress will find that the water-power companies have long ago conceded practically every principle of federal control, save and except that one which reserves to the government the right to arbitrarily revoke such grants.

The coming session of Congress will doubtless see a conclusion upon this subject; and either a practical system of laws will be enacted under which developments may proceed, or else the opposing theory of revocable permits and the like will control, which it is safe to say will prevent water-power development not only in this state but elsewhere.

If the federal laws favor water-power development there is no state which will eventually secure greater benefits than will Alabama. As a result it is entirely possible that within a few years Alabama will take a front rank among the industrial states of the country. The electric energy thus produced may be used in many ways among which the electric furnace is possibly the most important at the present time. New processes involving the use of this furnace have been perfected within the past few years. A large amount of horsepower has been developed in European countries for the fixation of atmospheric nitrogen in the form of nitrate of lime, nitrate of soda and cyanides, which products are used in the manufacture of fertilizers, cyanamids, and other needful products.

Frank S. Washburn, president of American Cyanamid Company, thus described the process in his address before the National Conservation Congress at Washington November 18, 1913:

"The cyanamid process for the fixation of atmospheric nitrogen proceeds by the way of combining nitrogen gas with calcium carbide to form calcium cyanamid. The characteristic steps of the process are simple, consisting first of bringing calcium and carbon, in the forms respectively of lime and coke, into chemical combination in the intense temperatures of the electric furnace, forming calcium carbide, grinding this product to a powder and treating it in a secondary set of electric furnaces with nitrogen gas of a high

[1] Paper read at meeting of Alabama Light and Traction Association, Montgomery, Ala., October 21, 1915.

degree of purity. The nitrogen is best secured by the mechanical liquefaction of air and its coincident fractional distillation. The product from the secondary furnaces is crushed and reduced to the form of powder, hydrated to remove caustic lime, and is ready in this state for direct application to the soil, either alone or in combination with other plant foods. Cyanamid has other uses as the raw material in the manufacture of a long line of derivatives, such as ammonia, nitric acid, ammonium nitrate, and, possibly more important than all of these together, in the production of a cheap cyanide, which may have a profound effect on gold, silver, and copper reduction. The product, ton for ton, has a higher fertilizing value than Chilean nitrate, and per unit of nitrogen practically the same fertilizing value as calcium nitrate, Chilean nitrate, sulphate of ammonia, blood, tankage, and cottonseed meal."

The cyanamid industry at this time represents the investment of more than $30,000,000, and is established in practically every country in Europe, in Canada and Japan, but there is no factory in the United States. This process may be expected later to give the world its nitrogen supply at half the price that it will otherwise command. The conservation of the soil fertility would be wholly inadequate to the needs of the world except that it included the use of nitrogenous fertilizers.

It would be difficult to imagine a combination of circumstances offering a more extreme case of the value of conserving the natural resources, for, we have here the possibility of using the power of the rivers which has been going to waste by nonuse since the dawn of the world, and harnessing this wasting energy in the manufacture of a fertilizer by the fixation of the nitrogen in the atmosphere, the supply of which will be inexhaustible to the end of time, and as a most useful result, directly cheapen and increase the country's food supply.

In 1912 arrangements were made to introduce the cyanamid industry in Alabama. It was early perceived by the Alabama Power Company that the development of a single power site on a stream as variable in its flow as southern rivers usually are could not possibly be remunerative, and it appeared advisable to proceed immediately with plans for another development on the Coosa River at the site selected for lock and dam numbered 18. Application was made to Congress for the necessary permission to construct the dam at that site, under the terms of existing federal statutes. The Act was passed by Congress, but because of certain opposition at Washington, the president vetoed the bill, although in exact accord with the general Dam Act of Congress which was then, and for that matter, still is, in vigor. The veto of the president and the consequent uncertainty of the company's position made it impossible to establish the proposed cyanamid factory in Alabama, and as four million dollars had been specifically provided for this purpose, and could not be indefinitely held up, it was decided to establish the new works in Canada where power was much cheaper and every protection was offered. That plant has since been completed and is now in successful operation.

This new policy of the Federal Government prevented the opening to navigation of another long stretch of the Coosa River, and deprived Alabama of a new industry which promises to be one of the world's greatest. It prevented the location in Alabama of a new factory permanently employing hundreds of men, of whom a very large percentage would have been skilled scientists of the highest class.

Let it be remembered that to prevent the use of running water for the fixation of atmospheric nitrogen is simply to prolong and strengthen the monopoly of the world's supply of nitrogen controlled from the plains of Chile, because it is otherwise the single natural available source of supply. In one recent year, $75,000,000 worth of nitrate was exported from that country, practically 80 per cent of which was used in agriculture. During the last decade the exportation of Chilean nitrate has increased 60 per cent in quantity, 60 per cent in price and 150 per cent in total value.

With cheap power Germany has been able to produce new nitrogen compounds which threaten to revolutionize our present system of fertilization. This industry, to which the war has given the impetus, has assumed such dimensions and has given such unexpected results, that the government requested the German parliament to grant an imperial nitrogen monopoly. From the official documents it appears that chemical compounds have been discovered which allow the production of a *universal fertilizer*.

That this scientific achievement will prove of momentous importance appears from the fact that the giant chemical works which supply the world with dyestuffs, synthetic remedies and other coal-tar products, have become important factors in the fertilizer industry of Germany.

These sources of nitrogen assure to Germany an unlimited supply of nitric acid for all war purposes, and enable that country today to prosecute the war with practically absolute independence of all other sources of nitrate.

Senator Underwood recently pointed out that the Ordnance Bureau of the War Department had under congressional authority been endeavoring for years to accumulate a reserve supply of 65,000,000 pounds of sodium nitrate, and had at this time approximately from 40,000,000 to 50,000,000 pounds, and at the present rate of supply it would require something over five years to complete the reserve, and consequently much of the country would be unprotected for want of an adequate supply of sodium nitrate in time of war. This condition alone furnishes an opportunity to build up a great nitrogen industry in the United States, which would require enormous quantities of electric energy, and would free this country from its dependence upon foreign countries in this respect.

The electric furnace is being used more and more in metallurgy, and it is apparent that with the development of cheap hydroelectric power great amounts of electricity will be used in the treatment of ores and the manufacture of steel.

It is further of interest to note the use of electric energy in the operation of pumping plants to convey water in the arid regions of the west, and the operation by electrical energy of several lines of railroads in the mountainous regions of the west. Through some sections this has resulted in a large reduction of operative delays, an increase in ton-miles hauled per annum, and a large decrease in operating expenses, and as a result, of course, much coal is saved, and the water power, a product that has gone to waste from the beginning of time, is utilized. Furthermore, a large amount of the equipment owned by the railroads, normally used in carrying coal, is released for more useful purposes.

The foregoing are merely a few examples which show that new uses and new markets are created for electrical energy, if only the tenures are permanent and safe, and the size and cheapness of development are such as to make reasonable profits possible at low selling costs. Every practical man of wide experience in the electrical industry knows that the permanency and safety of the investment means more and cheaper development capital, if not the ability to get capital, and that in turn the cost of capital is by far the most important element in the development of the industry.

Water-power development in different parts of the country is already projected to the extent of more than $100,000,000, and only awaits the passage of water-power legislation by Congress under which capital may be safely provided for construction purposes.

New Electrification Work on London Suburban Railroads.

The electrification of practically all the suburban lines of the London and South Western Railway which has been in progress for the past two years in England is now nearing completion. The power house is situated about the center of the system as regards distribution, and takes condensing water from the River Wandle. The boiler-house equipment comprises 16 Babcock boilers with a firing floor between two sets of eight. They have chain-grate stokers; Green's economizers are fitted; coal-bunkers holding 1,400 tons of coal are over the firing floor and the basement contains the suction ash plant and the main flues.

In the turbine house there are five main turbo-alternators of 5,000 kilowatts capacity (1,500 revolutions), generating at 11,000 volts three-phase; the turbines are of the impluse type and each has a separate condenser in the basement. Each set embodies a direct-connected exciter and motor-driven fan for ventilating the alternator. There are three auxiliary turbo-generators of 400 kilowatts, 200 volts, direct current, for power and lighting; the turbines run at 5,000 revolutions and drive the generators through gearing at 575 revolutions per minute.

All the high and low-tension switchgear is placed in a separate bay running the whole length of the power house. This bay is 21.5 feet wide and the switchgear is arranged on three floors. The high-tension switchgear is of the remote-control type and is in three groups. The group busbars are connected to the main or interconnecting busbars through oil switches fitted with an automatic maximum release with a time element. Cable boxes and transformers are on the turbine-house floor, oil switches and operating mechanism on the first floor, on which is also the control room, and the busbars on the second or top floor. The auxiliary switchboard for the 200-volt continuous-current supply is erected in the switchroom adjacent to the main control-board. A 220-volt battery is also installed for the purpose of ensuring the supply of current for control purposes. To ensure a continuous supply of feed water, a storage tank having a capacity of 110,000 gallons runs the whole length of the building on the flat roof over the switchgear bay.

As mentioned above the condensing water is normally obtained from the river and two ferro-concrete ducts are laid for this purpose. At times of drought circulating water will be drawn from the outlet duct by means of motor-driven centrifugal pumps, and pumped over cooling towers erected beside the water ducts at the power-house and nearest the river. Two motor-driven screens in the inlet duct will remove weeds, leaves and other refuse from the river water. The outer or coarse screen consists of fixed bars, cleaned by a motor-driven rake, and will deal with 2,000,000 gallons of water per hour. The inner or fine screen is a rotating disk, the top being cleaned by water jets and the bottom collecting any fine particles or gelatinous matter getting through the outer screen. The water flowing back from the power house to the river forms a series of cascades and is cooled before being finally discharged into the river.

Repair and inspection shops for dealing with the electric trains have been erected adjacent to the power house.

The extra-high-tension feeders between the power house and the substations are three-core, delta-section, paper-insulated, lead-sheathed, single-wire-armored, and jute-served. Four sizes of cable are used: 0.2, 0.15, 0.1, and 0.06 square inch respectively. Generally, the cables are run beside the line upon hooks fixed to posts, but where they cross the line or run through station platforms they are laid in asphalt troughing. A large proportion of the 11,000-volt feeder system is in the form of a ring main and where duplicate cables are provided in this ring, they are fitted with protective gear consisting of balanced relays, which, in the event of a fault, isolate the length of defective cable at both ends. Duplicate cables which do not form part of the ring main are provided with balanced relays at the feeding end and balanced reverse-power relays at the receiving end. Two lengths of single feeder are fitted with Merz-Price protective gear, in connection with which three-core pilot cables have been provided.

The 11,000-volt supply is distributed to nine substations where it is transformed down and converted to continuous current at 600 volts, at which pressure it is delivered to the conductor rails on the track.

The substations are situated at Waterloo, Clapham Junction, Raynes Park, Hampton Court Junction, Kingston, Sunbury, Twickenham, Isleworth and Barnes.

They contain static transformers, rotary converters and the necessary high and low-tension switchgear. The rotary converters are of two sizes, viz., 1,875 and 1,250 kilowatts, and each of them is supplied by three single-phase oil-cooled transformers.

The high-tension switchgear is completely inclosed in molded stone cells, and, with the exception that the oil switches are hand-operated, is similar in construction to that installed at the power house. Each of the continuous-current feeder panels controls two circuits, each of which has a maximum capacity of 5,000 amperes.

The feeder circuit-breakers are equipped with indicating lamps which, when the breakers are open, show the position of the breaker through which the different sections of conductor rail are fed from the next substation.

The third rail is laid at one side of the track 16 inches from gauge, and 3 inches above rail level; it is of special high-conductivity steel and weighs 100 pounds per lineal yard. The resistance is approximately 6.75 times that of copper of equal volume. It is bent down at the ends to form the ramps, and is bonded at the joints with four copper bonds having a total cross-sectional area of 1.4 square inches.

The jumper cables connecting adjacent lengths of conductor rail at crossings and other points where it is necessary to have a gap in the rail, are of one square inch sectional area, and are made up of 127/0.101-inch diameter copper wires insulated with rubber, bitumen-sheathed and braided.

The return circuit is formed by the running rails, the joints of which are bonded with two copper bonds of the protected type placed under the fish-plates. These bonds are made up of copper strips, and have a total cross sectional area of 0.33 square inches.

The running rails are cross-bonded at frequent intervals.

The rolling stock consists of 252 51-foot compartment-type coaches, until recently used in steam service and now converted for electrical working.

The substations, passenger stations, freight yards and sidings, between Waterloo and Clapham Junction, and on the "Kingston Roundabout" line, will take their lighting supply through a separate cable, which will also serve for supplying power in connection with the track-circuit signaling arrangements. Single-phase alternating current at a pressure of 3,300 volts is supplied through this cable to static transformers placed in small brick chambers built at intervals along the route, current being transformed down to 220 volts.

The 3,300-volt supply is obtained from frequency-changer sets situated at the power house and at Waterloo, Clapham Junction, Raynes Park, and Twickenham.

Four of the sets consist of single-phase generators driven by three-phase induction motors, which obtain their supply from the 11,000-volt busbars through step-down transformers.

To ensure an absolutely reliable supply, three motor-generator sets are

also provided. Two of these are at the power house, and consist of single-phase generators direct-coupled to 220-volt motors driven off the power-house auxiliary supply and storage battery.

The third set is at Waterloo substation, and the motor driving the generator is, in this case, supplied from a 600-volt battery installed as a standby to the lighting of the terminal station.

The 3,300-volt feeders are 0.05 square inch, twin-core, paper-insulated, copper-taped, lead-sheathed, wire-armored, and served, and are divided into sections at the transformer chambers, where they are connected to oil switches.

These oil switches are fitted with trip coils operated by relays, having operating coils connected to the copper tapes on the cables. In the event of a fault developing on a length of cable, the relays at each end of the defective length come into operation, and trip the oil switches, thus cutting out the length.

The London suburban system of the London and South Western Railway is one of the largest electrification works carried out on British railways. The lines form the circular route from Waterloo via Wimbledon, Kingston, Twickenham and Richmond, back to Waterloo, the Hounslow loopline, and the Hampton court, Claygate and Shepperton branches. The route length is 47 miles with 140 miles of single track. Later a further 50 miles of route with 100 miles of single track will probably be electrically equipped.

It was after a full investigation of all the systems in commercial use that the engineers of the railway decided to adopt direct current with 600 volts on the third rail. We are indebted to the general manager of the railway for the very complete particulars which we are enabled to give concerning the equipment.

The trains are equipped for multiple-unit working, and in three-coach units, a trailer coach being closely coupled between two motor coaches. Three or six-coach trains will be run according to traffic requirements. Each three-coach unit weighs 94 tons unloaded and seats 190 passengers. Each unit is equipped with four 275-horsepower motors, 590 revolutions per minute, geared 21/59 on standard 42½-inch driving wheels; these motors are series-wound, totally inclosed, arranged in pairs on the bogies underneath the driving compartments at opposite ends of the unit. All the electric control gear is placed in these compartments, each pair of motors being controlled by its own set of control gear. The arrangement of the control gear in the driver's cab was decided upon by the railway company's engineers in preference to having it underneath the coach on account of the greater ease of access for inspection, cleaning and adjustment. The positions of the individual pieces of apparatus have been carefully arranged with this end in view. Access to the control apparatus is obtained on the one side from the driver's compartment and on the other through large hinged doors in the partition between the driver's and luggage compartments. The advantage of placing the control apparatus in the driver's cab is that the weight of this apparatus comes over the driving bogie and so increases the adhesive weight on the driving wheels.

The box-type frame is used for the motors; the bearings are carried in end housings and the motor is equipped with commutating poles. Special machine tools were designed to overcome the difficulties met in machining the box type of yoke, also in the planing of the interpole seats which lie as it were in the corners of the box-type frame. The motor casing is carried by a suspension bracket which is supported through rubber springs from the truck transom.

The control of the trains is effected by the Westinghouse "All-Electric" system of automatic relay control. The motor current is handled by electrically operated contactor switches, the operating coils of which are connected to control wires running throughout the length of the train and actuated by six small master controllers. The contactors are provided with interlocking switches connected in their operating circuits to ensure the correct sequence of changes in the connections. The motor equipment on each coach is controlled during the accelerating periods by its own relay, which is independent of the other relays on the train; therefore the motors on the different coaches are notched up in accordance with their individual requirements, which are, in a measure, dependent upon the diameter to which the wheels may be worn and the slight inherent differences in the characteristics of the motors. The load on the different motor coaches is equalized and a low energy consumption obtained. The master controller is a very simple piece of apparatus; the driver merely has to move the controller right round to the full "on" position and the relays automatically do the rest. Powerful magnetic blow-outs are fitted to all apparatus where there is a possibility of arcing. Each contactor and circuit-breaker is carried by a pressed-steel plate clamped to mica-insulated steel tubes which are fixed to two channel irons running the full length of the switch group. The interlocking switches are fixed at the back of the contactor switches, and are operated by a lever from the movable core of the contactor solenoid, thus ensuring a definite position of the interlocking switch, corresponding with a definite position of the contactor. The frame carrying the contactor switches forming the motor-car group lies across the width of the coach in the driving compartment. It also carries the necessary motor-starting resistances and the main fuse above the contactors. The motor resistances are of the usual three-point suspension grid type, mounted on mica-insulated tie bars fixed to pressed-steel end frames. The circuit-breaker is similar in construction to the contactor switches and is provided with heavy laminated brushes in addition to the contact jaws, and adjustable overload and trip coils.

The reverser is of the drum type. The drum castings are clamped to mica-insulated shafts provided with heavy copper contact segments. The fingers are made with renewable tips and provided with swan-neck finger springs and heavy copper shunts. The finger bases are clamped to mica-insulated bars. The interlocking of the control circuits for operating the reverser is effected by an additional contact drum attached to the main spindle, so that a fixed relationship between the making and breaking of the main control circuits is obtained. A powerful magnetic blow-out is provided for the interlock fingers, which are identical with the swan-neck fingers used in the master controller.

The master controller is of the drum type and is provided with both main and reversing handles, so interlocked that the reversing handle must be either in the forward or reversed position before the driver can operate it.

The main handle of the master controller has four operating positions, namely: The first position, usually called the "switching" position, gives series connections to the motors with all resistance in circuit; the second position brings the automatic relay into operation and the resistances are cut out of circuit step by step until full series is obtained; the third position connects the motors in parallel, the well known bridge connection being used in passing from series to parallel; the fourth position brings the automatic relay into operation again, cutting out the resistance step by step until full parallel is obtained. It is unnecessary to pause on each notch of the controller until the corresponding motor connections are completed, but the handle may be moved directly to either the series or parallel positions, when the control apparatus automatically notches up step by step until the position is reached corresponding to the particular notch on which the handle is placed.

The control apparatus throughout is constructed of non-inflammable material, and the whole of the insulation is of mica. Practically all the wiring is in the driver's cab, and the connecting train wires and through shoe cable are fixed on the roof of the coach out of the way of the uninitiated.

The lighting of the compartments was made the subject of special study by the engineers, and electric radiators are suitably grouped throughout the various compartments for heating purposes. The Westinghouse brake system is used on the trains, the air being supplied to the brake system by small compressors direct-driven by slow-speed motors, one of which is placed in each motor-car. The action of all these compressors on a train is controlled by a master governor and switch which produces uniform compressor labor throughout the train as all compressors start and stop simultaneously; this is the Westinghouse governor synchronizing system.

Important Utility Merger for Idaho Completed.

The Electric Bond & Share Company, of New York, through S. Z. Mitchell, president, has recently completed the details of a merger involving several important utility properties in Idaho. The amount of capital involved is said to be $20,000,000. The consummation of this deal has required more than a year of difficult work. All of the properties involved have been taken over by the National Securities Corporation, the holding company for the Electric Investment Company, the operating company.

Mr. Mitchell states that the immediate result of the combination of the properties will be an early unification of all of the plants affected. They will be connected as the power plants of Utah have been connected by the Utah Power & Light Company, so that the total resources of all of the plants will be available at any point of service. The present holdings of the company give them four plants, while two others are to form units in the power chain though not part of the merger. The plants to be so interconnected are the Oxbow plant on Snake River, Ore., the Swan Falls plant, the Malad plant, the Boise-Payette plant on the Payette River and the Shoshone and Thousand Springs plants. The first four are now owned by the new company. The Shoshone plant is allowed to combine in the power service by a permit granted by the state to the receiver, in whose hands the plant now is, and the Thousand Springs plant is allied with the Shoshone plant by contract.

The merger of the companies was authorized by the Idaho Comission.

Power-Plant Equipment for Massachusetts Institute of Technology.

The new boiler plant of the Massachusetts Institute of Technology will at the beginning develop about 2,000 horsepower in steam. It is modeled on the lines of a very modern power house, but unusually condensed, being ten feet narrower than any other station of similar capacity. This narrowness is because the building lies in the 90-foot strip belonging to Technology between Vassar Street and the railway. The latter affords economical delivery of coal in large quantities, and with mechanical stokers and other appliances the coal is not handled by men at any stage of its use.

The boilers lie transverse to the street and railway, being so placed in order to make more easy the addition of other boilers as the future needs of the growing Institute may demand. There will be 1,560 horsepower of new boilers and 400 removed from Trinity Place, the new ones being of the Babcock and Wilcox pattern, with Riley stokers and working under forced draft.

One especial feature will be that the boilers will be equipped for heavy overloading, so that they will be able to evaporate water to an almost unlimited extent in ratio to the combustion. When not in demand any boiler will be automatically slowed down.

There are features in this plant that make it different from ordinary commercial boiler rooms. It will itself be a laboratory for the use of students. The boilers are of the wrought-steel, water-tube type, designed for 175 pounds working pressure and superheating the steam 100 degrees Fahrenheit, an important economy in the use of the steam turbine. The stack measures ten feet in its bore and 18 feet in outside diameter and will stand 180 feet above its base.

To convey steam to the buildings and laboratories where it will be needed a subway of reinforced concrete is being built, about seven feet square in inside measurements and 625 feet long. For furnishing condensing water for the turbines a concrete main has been laid. This conduit is 30 inches in diameter, running back from the Charles River Basin along the western edge of the great court. It will be over a quarter mile in length, and in rainy weather it will collect the rainfall of the area and turn it in for condenser water.

The electrical outfit is an interesting one, since the engine room will serve for substation as well as for central station. The initial equipment will include three turbines direct-connected to generators, one of 750 kilowatts, a second of 500 kilowatts and the third of 150 kilowatts, furnishing three-phase current at 2,300 volts. There will also be one 150-kilowatt turbine and two 150-kilowatt motor-generators furnishing direct current at 110 and 220 volts, and two 35-kilowatt exciters, one each steam and turbine-driven. The current in various voltages will be conducted to the buildings and laboratories in lead-covered cables running in a special conduit.

The steam laboratory itself is to be located in the long building, near and parallel to Massachusetts Avenue. High-pressure steam coming through the subway will be distributed to two mains below the ceiling of the first floor. There will be a superheater here connected at will with the machines where experiments are to be made. The condensers of the various engines in this laboratory are in the basement and take the cooling water from one of the large hydraulic canals, passing the warmed water into a hot-water return. In the basement there will be apparatus for determining the flow of superheated steam through orifices or turbine nozzles.

On the first floor of this building will be located the engines which make a formidable showing. There will be a Curtis turbine of about 75 kilowatts capacity, a 30-horsepower Corliss engine with dynamometer attached to the flywheel, a 225-horsepower McEwen tandem compound, a compound and generator of the same make of 250 horsepower, and a triple-expansion Corliss. These engines will be ranged along the western wall of the building. On the opposite side of the great laboratory will be a Brown engine, driving a three-stage compressor, which compresses air to 2,500 pounds per square inch. There will be two or three other compressors, and a few small engines to illustrate different types.

Success of German Central-Station Company in Spain.

Information has recently been published of the successful year's work of the Compañía Sevillana de Electricidad, of Seville, Spain, the receipts during 1914 having been 2,267,436 pesetas (peseta=$0.193) against 2,077,110 in the preceding year. The net profits for 1914 were 980,336 pesetas against 886,660 pesetas in 1913, and of the former amount 47,968 pesetas was added to the reserve, 384,000 pesetas paid in dividends, and 350,000 pesetas set aside for amortization of bonds.

Since 1911 the company has paid dividends of 8 per cent annually, established a reserve of 405,480 pesetas, paid 3,348,020 pesetas for amortization of bonds, and now has a capital of 12,800,000 pesetas.

BOOK REVIEWS.

"Standard Handbook for Electrical Engineers." Fourth edition. Prepared by a staff of specialists; Frank F. Fowle, editor in chief. New York: McGraw-Hill Book Company, Incorporated. Leather, 1984 pages (4x6¾ inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $5.00.

After considerable delay and many announcements by the publishers, the fourth edition of the "Standard Handbook for Electrical Engineers" has finally been issued. In its present form it is a much larger volume than any of the previous editions, and as it embodies so many changes and so much new matter it is substantially a new book. Practically all of the old material that has been retained has been rewritten and more conveniently and logically grouped. Much new material has been included in the old sections retained, and in addition, sections 11, 12, 14, 15, 17, 18, 20, 23, and 25 are either entirely new, or contain entirely new material.

Space does not permit a review of each individual section, suffice it to say, that the whole field of electrical engineering has been covered, as is evident from the section headings, which are as follows: Units, Conversion Factors and Tables; Electric and Magnetic Circuits; Measurements and Measuring Apparatus; Properties of Materials; Magnets, Induction Coils, Condensers and Resistors; Transformers and Rectifiers; Alternating-Current Generators and Motors; Direct-Current Generators and Motors; Converters and Double-Current Generators; Power Plants; Power Transmission; Distribution Systems; Interior Wiring; Illumination; Industrial Motor Applications; Electric Railways; Electric Commercial Vehicles; Electric Ship Propulsion; Electrochemistry; Batteries; Telephony and Radiotelegraphy; Miscellaneous Applications of Electricity; Mechanical Section; Standardization Rules of the A. I. E. E.; Engineering and Central-Station Economics.

Indices to the sections for quick reference are given on the inside of the front and back covers; each section is introduced by a table of contents and concluded with a well selected reference bibliography. This last is an exceptionally valuable feature. A most complete index to separate items closes the book.

Very little adverse criticism can be made of the contents of the volume. The high standing of the authors of the several sections is a guarantee of the reliability of the material included. It seems to the reviewer, however, that a four-place table of logarithms is of little use in an engineering handbook. Calculations made by the aid of a good slide rule are practically as accurate, and hence if the inclusion of a table of logarithms is thought necessary, a more accurate one should have been used.

Of course the reviewer has not attempted to verify the accuracy of all of the data contained in the book. There is one item, however, in regard to the constant, k, of a ballistic galvanometer which is not clearly explained in this, as well as in some other handbooks and text books. It is not stated in Section 3-17 that the values of this constant when determined by the two methods outlined are not the same and that each has its limited field of application. For example, in Section 3-297 it is not shown by which method the value of k, as used in the formula given, is to be determined. If determined by the condenser method, the values of H obtained will be consistent, but they will not be the true values. This discrepancy was pointed out by the writer in the *Electrical World*, Vol. 53, p. 864.

The mechanical make-up of the book is in harmony with the other handbooks published by the McGraw-Hill Book Company. It is well printed and bound. Both the authors and publishers are to be congratulated. In view of the fact, however, that the book is too heavy for the pocket, it is the opinion of the reviewer that the size of the page might have been advantageously increased, thus decreasing the thickness of the volume and making it more convenient to handle.

C. M. JANSKY.

"Electric Cooking, Heating and Cleaning." By Maud Lancaster. American edition revised by Stephen L. Coles. New York: D. Van Nostrand Company. Cloth, 329 pages (5½x8½ inches), illustrated. Supplied by Electrical Review Publishing Company, Inc., for $1.50.

Originally written for women, this volume was first edited by E. W. Lancaster, who presumably is responsible for the general technical accuracy and for a variety of curves and charts. Now the resulting British edition has been revised by Stephen L. Coles (formerly managing editor of the ELECTRICAL REVIEW), who has Americanized it to a considerable extent, although evidently unable to find adequate substitutes for scores of the illustrations showing British types of heating and cooking apparatus. Consequently, we have here a book evidently intended for women, yet containing a variety of charts unintelligible to the average housewife and illustrations which may stimulate a demand for types of apparatus which the American central station or supply house cannot readily furnish. Yet, in spite of these incongruities, this is a work which central stations ought to use in their propaganda (as, for example, by presenting copies to the more prominent of the local women's clubs) and which should also be of value to their domestic-appliance salesmen.

Nearly 200 pages are devoted to electric cooking in general and to electric cooking appliances, much valuable information being given in a form in which it should appeal to the progressive woman and stimulate her towards using the appliances offered for this purpose. Then follow a hundred pages on other household uses of electricity other than for lighting, such as water heating, room heating, vacuum cleaning and ventilation. Occasionally, some statements lack a desirable accuracy, as when the authors state that electric ozone generators increase the amount of oxygen, but such slips are infrequent. The authors' practice of giving the operating costs for each appliance is admirable, though the wisdom of basing these costs on a rate of two cents per kilowatt-hour is open to question. Indeed, the volume closes with a tabulation of the rates charged by some four hundred central stations in this country for heating and cooking, of which only three offer such a rate for the average household consumption! The others range up to 20 cents per kilowatt-hour, although a few are reported as making no charge at all for such current. The omission of nearly all the larger cities is noticeable and makes this tabulation hardly representative of the cost of such current to the average user.

For American readers, the use of electric fans as auxiliaries to steam radiator and hot-air furnaces, and as means of removing frost from windows are so important as to deserve inclusion in a work of this kind. However, the book as it stands includes a wide range of electric appliances for household, hotel and restaurant use and should serve as an effective stimulant towards a more general understanding of the countless ways in which electric appliances can add to home comforts.

ALBERT SCHEIBLE.

"The Book of Wireless." By A. Frederick Collins. New York: D. Appleton & Company. Cloth, 222 pages (4¾x7¼ inches), profusely illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $1.00.

This is a volume for the amateur—one might say for the small boy; and the small boy constitutes the wireless operators of today to the number of thousands. The book describes the construction and use of a simple wireless outfit and devotes two chapters to the construction of induction coils, transformers and electrolytic interrupters. The government regulations are included and an appendix gives a dictionary of electrical words and other useful information for the amateur. The instructions given by the author should enable any boy with a normal aptitude for such things to do some interesting experimenting in the wireless field.

Mica is of widespread occurrence and has been mined in many countries, but the world's production has come chiefly from India, the United States, Canada, German East Africa, and Brazil. Deposits of probable value are known in more than 20 of the United States.

New Electrical and Mechanical Appliances

Three-Volt Dry Battery for Lanterns.

All dealers who sell battery lanterns will be interested in the latest development in this field: a new three-volt high-efficiency battery just perfected by the Usona Manufacturing Company, of New York City and Toledo, O. This is for use in all battery lanterns designed to use the standard No. 6 dry battery. The new battery has the same outside dimensions as the regular No. 6 battery, but is claimed to have twice the length of life and to give twice the amount of light possible from a No. 6 battery. This new battery is called No. 66 or Double Six, and should find a very large sale, as enormous quantities of battery lanterns have been sold. The manufacturer claims that the new battery will double the use-

Three-Volt Dry Battery.

fulness of the lantern both as to brilliancy of light and length of burning hours.

Factory Sewing-Machine Motor.

Practically all the labor incidental to the old-time method of sewing-machine operation is eliminated, and the output of the machine is greatly increased, by the use of the factory sewing-machine motor illustrated in Fig. 1. It is designed for heavy sewing service, such as is encountered in clothing shops, department stores, and awning and sail factories. It is very quiet in operation, requires practically no attention and can be applied to any make of sewing machine.

Modifications of the well known Westinghouse types CA alternating-current and CD direct-current motors are used on these outfits. To start the sewing

Fig. 1.—Factory Sewing-Machine Motor.

machine, a free running pulley belted to the handwheel of the machine is driven by a clutch operated from the machine treadle, and to stop it, a brake is applied as the clutch is released. Complete range of control is obtained by a slight movement of the treadle.

The needle is under the absolute control of the operator at all times. A slight pressure of the foot on the treadle is the only effort required to operate the machine even when running at a speed many times that obtainable when foot power is used. A single stitch can be made, the machine can be run continually at full speed, or any intermediate speed can be obtained.

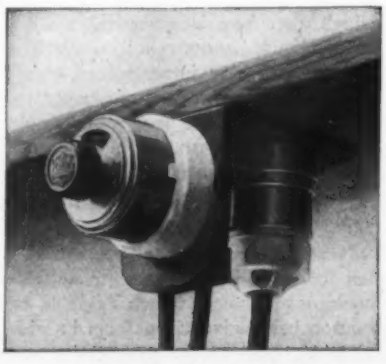


Fig. 2.—Switch for Motor.

These outfits are made in two styles, one for alternating and one for direct-current circuits. A switch, shown in Fig. 2, for mounting on the machine, is furnished for starting and stopping the motor. These motors are made by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

New Porcelain Strain Insulator.

A new type of strain insulator, known as the Triangle porcelain strain insulator, has been placed on the market by the Illinois Electric Porcelain Company, Macomb, Ill. As shown by the accompanying illustration, its form is such as to give it an exceptionally large leakage distance; this is said to be 50 per cent greater than that of any porcelain strain insulator. It is claimed to be about 30 per cent lighter in weight. The material is so disposed that the body is nearly of the same thickness throughout. This insulator

Triangle Porcelain Strain Insulator.

is also of such shape that in the process of molding the porcelain is made much more dense than in ordinary forms.

Helsby Power Condensers.

As the result of experimental work which has extended over many years, a new type of Helsby condenser has been patented and is being produced by British Insulated & Helsby Cables, Limited, of Prescot, England. It is a power condenser suitable for use in alternating-current power circuits. Two types of this Mansbridge self-sealing condenser are manufactured—the oil-immersed, and the solid impregnated. The former is recommended in cases where the working pressure exceeds 250 volts, alternating and the condens-

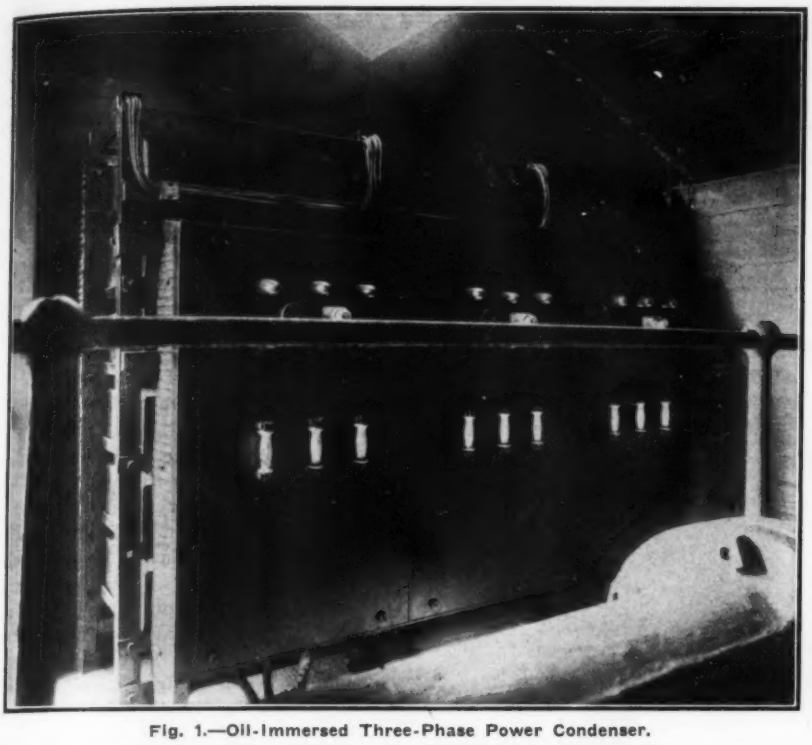


Fig. 1.—Oil-Immersed Three-Phase Power Condenser.

ers are continuously in circuit; the latter is recommended where the working pressure does not exceed 250 volts alternating or where the use of the condenser is intermittent.

The Helsby power condensers are used for power-factor improvement in alternating-current circuits; for the suppression of arcing in circuit-breakers and switches; for reducing the current or voltage on electromagnets and other electrical devices in high-voltage circuits; and for certain uses in wireless telegraphy. In addition, new uses are continually arising.

The condensers are manufactured by patent processes which give greatly increased dielectric strength while keeping the volume small and reducing the loss to a negligible quantity. Measurements of the losses made at Prescot and by independent experts, show that the efficiency at ordinary frequencies and temperatures always exceeds 99.5 per cent. The temperature rise of large capacities when working at their rated voltage and 50 cycles does not exceed 20 degrees Fahrenheit. The condensers are manufactured in units of about one microfarad and for a working pressure up to 550 volts alternating. The units are assembled in sealed metal cases in the numbers required, but for convenience in handling it is not advisable to exceed 50 microfarads in one such case. The cases of 50 microfarads each are again assembled in wrought-iron frames (or cast-iron cases for mining work) and provided with suitable switch and fuse gear.

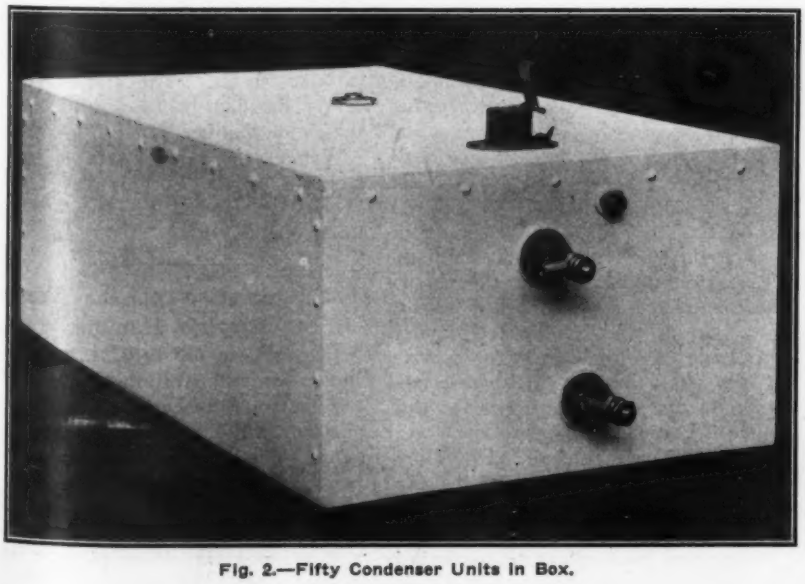


Fig. 2.—Fifty Condenser Units in Box.

It is claimed that the advantage of the use of condensers for power-factor improvement, in comparison with the installation of phase-advancers, synchronous motors, vibrators, etc., is that, if required, they can be supplied in small units, and connected directly to that portion of the system which is giving a low power-factor. The other methods entail the running of machinery, do not lend themselves to subdivision, and are costly to install and to maintain. On the other hand, a condenser can be connected directly to a transformer or motor and can be switched on and off with the machine, thus saving the losses in mains or feeders, the compensating being done exactly on the spot where it is required.

In the accompanying illustrations, Fig. 1 shows a Helsby oil-immersed three-phase condenser of 1,740-microfarad capacity in a colliery generating station; the output is 165 kilovolt-amperes at 550 volts, 50 cycles. Fig. 2 represents a box of 50 of these units for a working pressure of 550 volts alternating current. It measures 19 inches by 11 inches by 7.5 inches, and weighs 75 pounds.

Magnetic Gear Shift for Gasoline Automobiles.

A booklet bearing the title, "The Next Big Improvement in Automobiles," has just been prepared for distribution by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. The next big improvement alluded to is the C-H magnetic gear shift for gasoline cars which provides for shifting gears by the simple means of pushing a button. A description of the operation of this gear shift was published in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN early last year. The new booklet, as the name implies, shows why shifting gears by means of push-buttons is the next big improvement in automobiles, not that the device itself is so new, but that the general adoption and use will be the next big step in making the operation of a gasoline motor car easy and convenient. It is pointed out that people who purchased cars just before the electric self-starter was adopted soon found their brand new cars out of date, but they had no hint of this radical change until the automobile manufacturer had disposed of his stock and was ready to make his announcement. History is prepared to repeat itself in the case of the magnetic-gear-shift equipment. The magnetic gear shift is shown to be a simpler device than the self-starter and to use very little current for operation; it makes the gear-shift lever unnecessary, just as the self-starter made the

crank superfluous. It allows selection of the next speed prior to the time the gears are actually shifted.

The book also explains how everything on a car has been improved, how for instance, electricity is used for starting the motor and for lighting, but the method of shifting gears has remained the same although it is necessary to perform this operation many times more than starting and in many tight places where the eyes are needed on the road and both hands on the wheel.

One section of the book contains an elementary and easily understandable explanation of the magnetic gear shift with interesting illustrations. Motor cars equipped with the C-H magnetic gear shift are also shown and a number of particularly strong letters of recommendations from users are reproduced. Included in the list of cars on which these C-H magnetic gear shifts are in use are the Winton, Jeffery, Pierce, Franklin and Pullman.

New Position of Selector Switch for Magnetic Gear Shift.

Since this book was prepared primarily for the public, a little space is devoted to the Cutler-Hammer Manufacturing Company, and what it makes in the line of controlling apparatus, which is well known, of course, to anyone in the electrical industry. In the perfection of the design and construction of the magnetic gear shift, the experienced forces of the company have been utilized. The accompanying illustration shows the push-buttons as now placed on a bracket under the steering wheel. Formerly these were located at the center of the wheel.

Attachment Plug With Swiveling Flexible Handle.

The rapid increase in the use of all kinds of electrical appliances of low current consumption that can be connected to ordinary lighting outlets is calling for more convenient means for connecting these devices to the circuits. To insert an attachment plug through a narrow and deep glass shade or wire lamp guard is not a convenient nor rapid operation. Usually it requires removal of the shade; if the shade is not removed, it nearly always imposes a severe strain on the connecting cord due to violent twisting.

These difficulties have now been ingeniously eliminated by the development of a new type of attachment plug. This has a swiveling screw shell to which is attached a flexible extension five inches long that serves as a very convenient and useful handle. This extension is made of a neatly and smoothly finished piece of flexible-steel conduit; this is securely fastened to the swiveling shell and permits readily screwing the plug into the socket or receptacle, even though the shade opening is very narrow. The cord passes through the handle freely and is not twisted during insertion or removal of the plug; in fact, the handle also serves to protect the cord near the plug, where it is usually subject to much wear and tear. The cap of the plug is provided with cord grip and can be used with reinforced cable up to thirteen-thirty-seconds inch in diameter.

Swiveling-Handle Attachment Plug.

These new handle plugs are particularly useful with inspection lamps, vacuum cleaners, etc., that are frequently moved from outlet to outlet. They are made by the Benjamin Electric Manufacturing Company, 128 South Sangamon Street, Chicago, Ill.

Wayne Toy Transformers.

The Wayne toy transformer is a device by means of which electricity at low voltage may be obtained from an alternating-current lighting circuit for the operation of electrical toys, such as railways, locomotives, aeroplanes, motors, or any other toys which may be operated by alternating current.

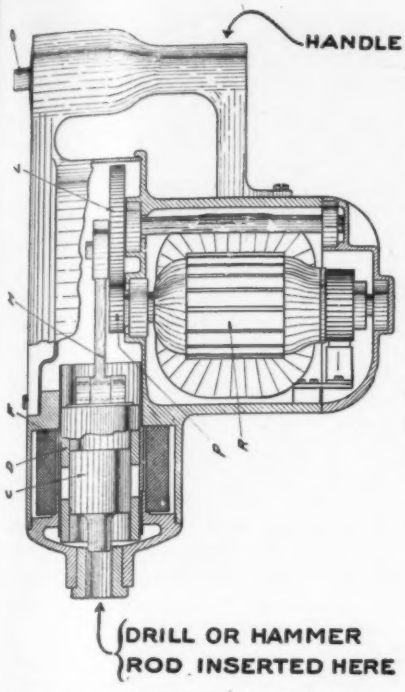
On account of the numerous sizes of toys it is necessary to have a wide variation in secondary voltage, because the smaller toys take from 4 to 10 volts, while the larger toys require from 10 to 24 volts. On these transformers the variation in voltage is accomplished by means of three terminals and a switch with a number of contacts. The different voltages are thus made available with only one change in the secondary connections. The flexibility of the voltage control not only permits of the operation of practically all the various electrical toys, but permits operating them at variable speeds. The transformer is neatly finished in black with bronze switch mechanism.

Wayne Toy Transformer with Connecting Cord.

Wayne toy transformers are manufactured by the Fort Wayne Electric Works of General Electric Company, Fort Wayne, Ind.

The Operation of the Western Electric Hammer.

In our issue of July 31, 1915, were shown some illustrations of a new electric hammer recently placed on the market by the Western Electric Company. The principle upon which this hammer works is as simple as it is clever and effective. The principal parts are a motor, a drill or hammer, and a magnetic clutch plunger inter-



Section of Electric Hammer to Show Operation.

posed between the other two parts.

Connected to the motor *R*, through hardened gears *P L* and connecting rod *H*, there is a cylindrical sleeve *D* having two relatively thick end sections joined together by a center section; the latter is as thin as is consistent with mechanical strength.

The plunger *C*, which delivers the blow to the drill, lies loosely within this cylinder and is not mechanically connected to any part of the mechanism. Outside of the sleeve lies the magnet coil F. This coil is stationary, the sleeve moving back and forth within it. The coil is in series with the motor and the current in it is always in the same direction and steady. As soon as the circuit is switched on, which is done by a button *O* conveniently arranged on the handle, the solenoid creates a magnetic circuit, with the thick sections of the sleeve as the poles and the plunger as the armature. As the sleeve is moved back and forth by the motor the effect is that of moving the pole faces of the magnet back and forth, and the plunger clutched across the poles moves with it, transferring its energy to the drill when it meets it, which it does near the end of the stroke. The plunger is slightly longer than the thin section of the sleeve which gives it a certain amount of overtravel and an elasticity of connection which entirely removes the strain and jar of the blow from the machine.

The motor is series wound and the gears are of oil-hardened special gear steel. Ball bearings are used throughout to reduce friction to a minimum.

Hotpoint Boudoir Set.

The approach of the holiday season is creating a demand for gifts that are truly useful, as well as pleasing to the eye. Since electrical gifts peculiarly fill this requirement, the coming holidays will doubtless see much greater sales of electrical gifts than heretofore. An outfit that is especially suitable as a holiday gift for ladies is the new Hotpoint boudoir set illustrated herewith.

This set includes a three-pound Hotpoint electric iron with beveled edge sole plate to permit ironing under and between ruffles, plaits, tucks, etc., an inverting stand by means of which the iron can be converted into a small

Electric Boudoir Set Complete.

electric stove for light cooking or heating, a hood or cover which can be placed over the sole plate of the inverted iron and form a receptacle in which two ordinary curling tongs or a marcel waver can be readily heated, a pair of folding curling tongs, and a connecting cord with small switch plug interchangeable with other Hotpoint appliances.

This entire outfit is arranged to be easily packed into a neat felt bag, making it convenient in traveling and easy to put aside, on account of the small space occupied. This outfit is very tastefully designed and finished in highly polished nickel, so as to make it attractive enough as an ornament to the dressing table. Despite its extensive equipment the entire set is obtainable at a very moderate price, making it within the reach of anyone as a holiday gift. This outfit is manufactured by the Hotpoint Electric Heating Company, Ontario, Cal.

Robbins & Myers Sales Conference.

The annual convention of the sales organization of the Robbins & Myers Company was held at Springfield, O., on October 20 to 22. Two and one-half days were devoted to the business of the conference and the final afternoon to relaxation and pleasure. Wednesday morning the meeting opened with a discussion on fan sales; W. W. Mumma, fan sales manager, presided at this session. On Thursday morning two sessions were held; the first was devoted to a discussion on motor sales, conducted by Eugene Newnham, motor sales manager and supervising engineer; the second session was concerned with advertising, the discussion being led by C. H. Clark, advertising manager. On Friday morning there was a general discussion on credits and collections, this session being presided over by C. C. Miner, auditor.

Both Wednesday and Thursday afternoons were allotted for individual conferences between the branch-office managers and the heads of the various departments of the home office. These conferences were arranged and carried out according to a definite schedule. Friday noon the serious business of the convention was brought to a close and all of the delegates were taken in two of the company's motor trucks to the log cabin of W. A. Myers, secretary of the company, where they were entertained with a buffet lunch. The afternoon was given to a get-together meeting and general good time. The illustration below shows the delegates at the close of the business sessions.

Delegates to Robbins & Myers Sales Conference.

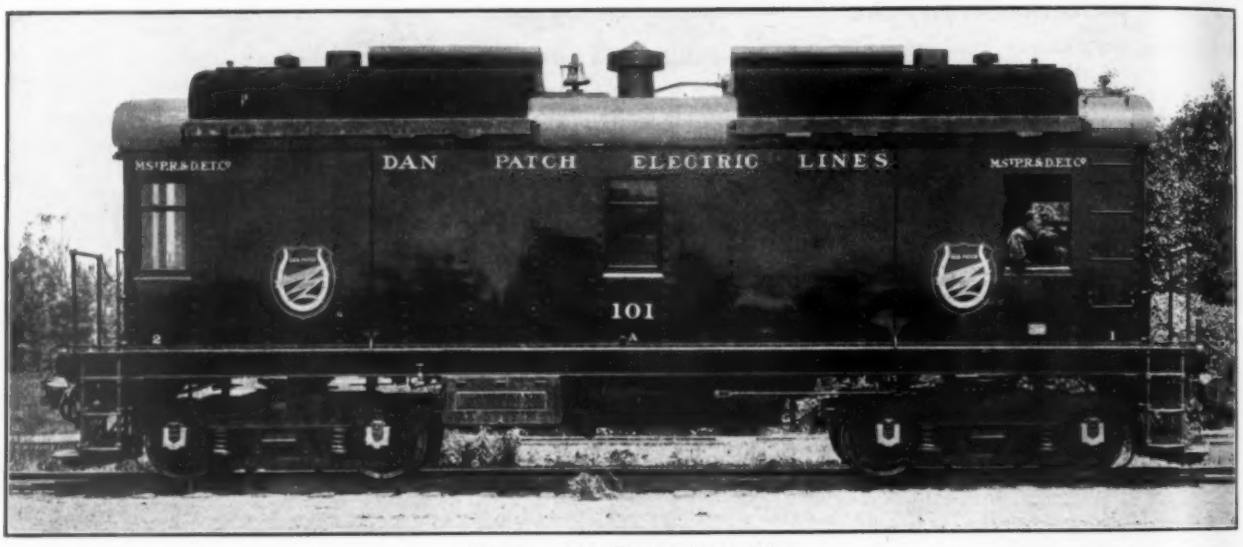
New Gas-Electric Locomotives for "Dan Patch" Electric Lines.

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, operating what are popularly known as the "Dan Patch" Electric Lines, has recently placed in commission three 60-ton gas-electric locomotives for freight, passenger and terminal service. These are somewhat similar in design although heavier than the 57-ton gas-electric locomotive which has been in successful operation daily on the company's lines for the past year or more from Minneapolis to Mankato, Minn. The four gas-electric locomotives, as well as 13 gas-electric motor cars which the railway company has purchased to date, were designed and built by the General Electric Company. It is interesting to note that this is said to be the first railroad in the world operated entirely with gas-electric service.

The railway extends south from Minneapolis 107 miles to Mankato. About midway of the line a branch runs northeast from Northfield to Randolph, seven miles distant. Another extension is contemplated from Faribault southeast to Owatonna, Waseca, Geneva, Albert Lea, Austin, Dodge Center, Rochester and beyond, having Dubuque, Ia., as its objective terminal point. The fine rolling section of Minnesota thus traversed, with productive grain fields, dairy and truck farms, and numerous thriving towns and cities of varied industrial activity, is one of the most prosperous in the state. The territory presents few difficulties in road construction, the severest grade on the present line being 2 per cent. The roadway was built, and improvements are being constructed, with a view to permanent stability. Substantial stations are located at the various cities and towns along the route, and smaller stations have been erected every few miles at rural stops to afford protection to the traveling public from inclement weather.

About 25 miles south of Minneapolis several thousand acres of farm land have been divided into five and ten-acre tracts by the company and are being sold to residents of Minneapolis and St. Paul, many of whom have erected houses and travel to and from their places of business in the city each day on the railway. There are also many attractive lakes along the route.

Four through trains daily each way, one of which is a limited parlor-car train, constitute the normal passenger schedule of the road. The limited makes the run of 107 miles, including four stops, in three hours and twenty-five minutes. This service is supplemented by local trains between certain points of the line and the terminals, and by excursion trains during the summer season as occasion requires. One 70-foot gas-electric motor car, seating 89 passengers, normally makes the run; when travel is somewhat heavy, a trailer is added to this; and for excursions and extra heavy traffic, a train is made up of trail cars drawn by a 60-ton gas-electric locomotive.



Sixty-Ton Gas-Electric Locomotive.

The new 60-ton locomotives are double-ended and are built with the box type of cab extending nearly the entire length of the underframe so as to have all the weight on drivers. Each locomotive is equipped with four type GE-205-D motors. The power plant consists of two generating sets similar to the one used in the gas-electric motor cars. Only an engineer is required to operate the locomotive.

The box cab is of all-steel construction. Both ends of the cab are removable to permit readily the installation of apparatus. The interior is not divided into compartments. The generating sets and the controllers are installed in each end, while the auxiliary lighting set, air compressor and storage tanks are grouped in the central section. The operator's seat at the side of each end of the cab affords a clear view ahead of both sides of the track. The mechanical parts of locomotives, such as underframing, draft gearing, trucks, etc., are of the most modern type of construction and are massively built to carry all the weight of equipment and withstand all possible strains.

The air brakes, with 16-inch brake cyinders, are of the combined straight and automatic type, arranged for double-end control. Air is supplied from the main engine compressors piped to the air tanks. The connections between the tanks and the operating valves are arranged to furnish air for starting and for operation of the brakes from independent sources. The brake rigging is proportioned for a brake-shoe pressure of 85 per cent of the weight on the drivers with 50-pound pressure in the brake cylinders.

Each of the two gas-electric generating sets for the power plant equipment is composed of a 175-horsepower, 550-revolutions-per-minute, eight-cylinder, four-cycle gasoline engine of the V type, which is direct-connected to a 60-volt, commutating-pole, compound-wound generator with an outboard bearing supported by brackets bolted to the magnet frame. The cylinders are 8 inches in diameter bore by 10 inches stroke. Ignition is accomplished with low-tension magnetos and the sets are started by air pressure in the same way as in the gas-electric motor cars, with the additional feature that after one set is running, the second may be started from the first electrically. The control is so arranged that either one or both of the generating units may be used to operate the locomotive from either end, in accordance with the requirements of the trailing train load. The engines are

Interior of Cab Showing End of One Main Unit and Side of Auxiliary Set.

of the highest type of construction.

Compressed air for starting is taken from the main reservoirs of the air-brake system, which are built with surplus capacity. The two main single-cylinder air compressors are driven from the crank shafts of the main engines, have a displacement of 22.5 cubic feet of free air per minute at the rated speed and are fitted with automatic governors to maintain constant pressure.

Greater flexibility of control and economy of operation result through electrical transmission of the energy. The engines can rotate at normal speed irrespective of the speed of the locomotive and deliver their maximum power, a feature of great advantage on grades, in case of snow storms or other emergency conditions involving sudden and heavy power demands.

There is also an auxiliary gas-electric set, the function of which is to furnish power for lighting the cab, headlights and train coaches, and for pumping an initial charge of air to fill the tanks and start the main engines. This set is started by hand. It consists of a vertical, 750-revolutions-per-minute, four-cylinder, four-cycle gasoline engine, which is direct-connected to a five-kilowatt, 65-volt, commutating-pole, compound-wound generator. The cylinders are 3-inch diameter bore by 6-inch stroke, and ignition is effected by a high-tension magneto. The air compressor on the 65-volt circuit is a two-cylinder, motor-driven, railway type machine, and has a piston displacement of 25 cubic feet per minute when pumping against a tank pressure of 90 pounds per square inch. Air is taken from the cab interior through screens and is delivered to the three reservoirs installed at one side of the cab in the center and connected in series, thereby affording an opportunity for radiation of heat and condensation of moisture before entering the brake cylinders. After starting the main engines, the governor on this motor-driven set cuts it out and all air is supplied by the air compressors on the main engines.

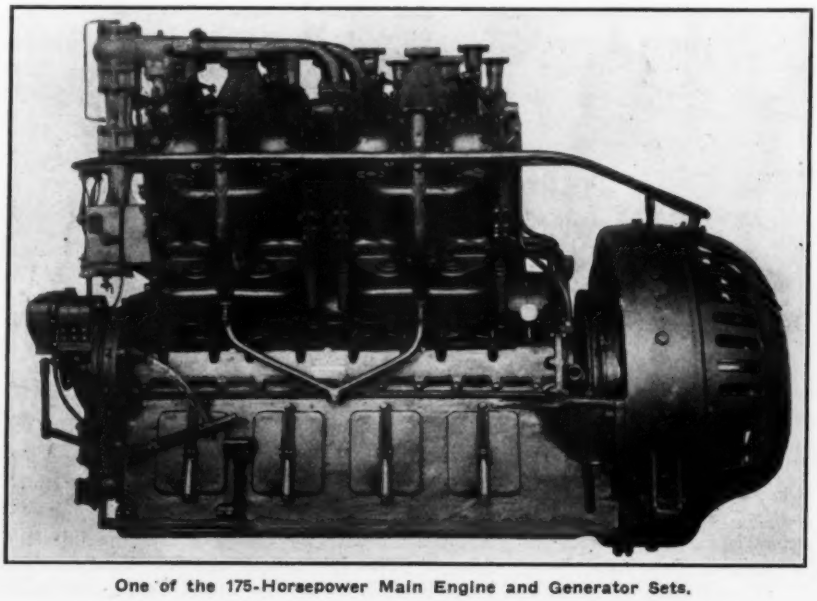
Mounted on the axles with nose suspension are four 600-volt, series, commutating-pole, oil-lubricated, box-frame railway motors having an hourly rating of 100 horsepower each. All four axles are therefore driving axles, a forged pinion being mounted on each armature shaft and meshing into a corresponding cast-steel split gear mounted on the axle. The gear ratio is 58 to 17, which is especially adapted for freight and terminal switching service, as it affords maximum tractive effort at start and low speeds. The motors are ventilated by a special vacuum system in conjunction with the engines.

The control of the motor equipments is similar to that of the standard gas-electric motor cars, a type P-53 controller being installed in each end. Two motors are, however, connected permanently in parallel and these two pairs, operated like single motors, are placed progressively in series and parallel. The controller provides seven running steps in series and six in parallel, without rheostats in the main circuit. There are also two additional points for shunting the series fields, making a total of fifteen efficient running points.

Inasmuch as electrical energy is transmitted directly, there are no losses through the intervention of mechanical change-speed gearing. To produce the smooth and rapid acceleration, the speed changes of the motors are effected by governing the voltage through varying the strength of the generator fields, which is accomplished by the movement of one handle on the controller. Separate handles are provided for throttling the engine and for reversing the motors. The latter is accomplished instantly by changing the motor connections in the usual manner, without stopping the engines, which always rotate in the same direction. This allows the train to be brought to a halt quickly, independent of the brakes, in an emergency.

A single-unit headlight, fitted with a 250-watt, 65-volt, gas-filled Mazda lamp, is mounted on each end of the cab. Car lighting arrangements include six Mazda ceiling lamps; four receptacles for the portable lamp; one portable lamp with guard, flexible cord and plug; and bus line connections at each end for train lighting.

In 1914 the mica produced in the United States was valued at $328,746. The output of sheet mica amounted to 556,933 pounds, and that of scrap mica amounted to 3,730 pounds.



One of the 175-Horsepower Main Engine and Generator Sets.

Edwards Lighting Fixtures.

Great progress has been made in the production of designs of lighting fixtures combining artistic appearance, good lighting effect and moderate price. In view of this advance by the fixture designer and manufacturer in making available an array of designs satisfactory in respect to all these usually conflicting requirements, it is now possible to select lighting equipment to satisfy the very general desire for good quality combined with more or less individuality.

One of the fixture houses that has given a great deal of attention to these matters is the Edwards Lighting Fixture Company, 65 East Lake Street, Chicago, Ill. This company has produced fixtures ranging from the very exclusive and highly ornamental designs commanding high price to the relatively inexpensive and very simple designs. A new series of pleasing designs has been announced by the firm, comprising an extended assortment of patterns available for immediate shipment. These fixtures include a very large number of distinct types meeting the requirements of the different rooms in a residence or apartment and the many different tastes. In all cases there is incorporated in the design practical utility and as much decorative effect as is warranted.

Fig. 1.—Attractive Four-Light Fixture.

Fig. 1 shows one of these new designs. This is a unique and very handsome fixture. The four arms, the socket husks and other ornaments are made of cast metal. The finish is a rich antique brush brass. Attractively etched glass shades screen the lamps. The full length of the fixture is 35 inches and its spread is 13 inches. Key sockets and spring shadeholders are furnished.

Fig. 2 is a pleasing design of the rapidly increasing popular semi-indirect type of fixture. The bowl is 16 inches in diameter and is made of a good diffusing white glass tastefully ornamented. The fixture is 33 inches long. Three lamps are arranged in the bowl, giving it a uniform brightness. Canopy, chains and bowl supports are finished in brush brass.

Fig. 2.—Semi-Indirect Fixture.

An attractive upturned bracket is shown in Fig. 3. This has a cast canopy and husk. A key socket with cover is supplied. The shade is of Veluria glass of a handsome pattern. Antique brush brass finish is given to the metal parts.

Fig. 3.—Upturned Bracket.

A simple but pleasing type of ceiling fixture is that shown in Fig. 4. This has a cut glass shade with star pattern; its dimensions are 3.25 by 7 inches. The finish is brush brass and black.

Fig. 5 shows another bracket of artistic pattern. It has an oval back 4.5 by 9 inches. The supporting arm is cast brass. Key socket with cover and including a unique shadeholder part is furnished. A very pleasing form of Veluria glass shade screens the lamp.

The few designs shown are typical of this entire new line which includes also combination fixtures. All these fixtures are obtainable for immediate shipment complete as shown, or unwired and without glassware, if desired.

Fan-Window-Display Contest.

Considerable interest has been manifested in the layout of the displays that won the six prizes in the fan-window-display contest conducted by the Western Electric Company. The list of the prize winners was published in our last issue, also illustrations of the displays which were awarded the first and second prizes. Herewith are shown views of the displays which received third and fourth prizes, respectively. The third prize was given to the Albuquerque Gas, Electric Light & Power Company, of Albuquerque, N. M. The fourth prize was awarded to the Clinton Electric Light & Power Company, Clinton, Ind.

British Standardization of Meters.

The British Engineering Standards Committee issued in September its standard specification (No. 37) for electricity meters (excluding electrolytic meters). During the past 12 months this specification has been undergoing revision by the electrical accessories subcommittee, and in its new form it has been entirely redrafted and considerably extended in consequence of the large increase during recent years in the size of individual in-

Fig. 4.—Ceiling Fixture.

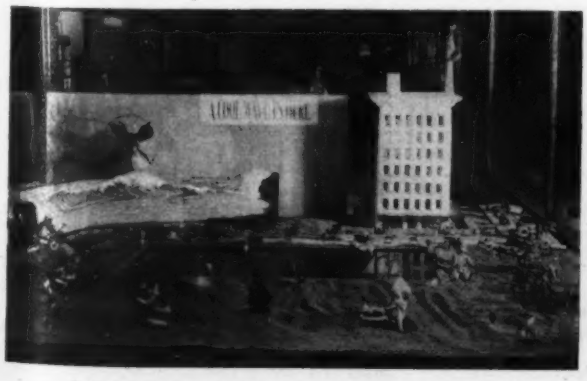
stallations arising from the extended use of electrical energy supplied from central stations. The first edition which appeared eight years ago referred only to consumers' meters of sizes up to 100 amperes, but the revised report includes provision for meters up to the very largest sizes in use, as well as for three-wire and three-phase meters.

The new specification is intended to apply to the purchase of new meters, governing their sale by the manufacturer to the purchaser and it has no direct bearing on any questions arising between the central stations and their consumers in connection with such of the meters as are employed to register energy supplied from their mains. The requirements have, however, been drawn up so that the meters conforming to them may reasonably be expected to fulfill the conditions imposed by the British board of trade on meters used in connection with public supply undertakings, and to satisfy inspectors under the English electric lighting acts during a considerable period after the meters have been put into use.

Fig. 5.—Pendent-Lamp Bracket.

Important modifications and additions have been made as to standards and definitions. It has now become necessary to distinguish between the portion of the main circuit in the meter and the portion outside the meter. This is done by defining, in addition to the definition of main circuit, the pressure circuit and the meter current circuit and meter pressure circuit. The standard sizes of meters include sizes for currents up to 5,000 amperes. The registering maximum is dealt with at some length and the terms to distinguish the different types of counting mechanism are pointer type for the ordinary clock face, with a rotating pointer and counter type for the so-called cyclometer mechanism. In the latter case it is specified that the figures shall spring quickly into position excepting the lowest figure used. The meters are required to have the testing constant plainly marked and this constant is specified as the number of revolutions per minute which the rotor should make at the full load of the meter under standard temperature conditions.

The factory of the United States Electrical Manufacturing Company, at Los Angeles, Cal., was destroyed by fire on October 27. Temporary quarters were immediately secured, machinery installed and by November 1 the output was nearly up to normal. In about 60 days the company expects to move back to its rebuilt plant, which will have new machinery and up-to-date equipment throughout.



Third-Prize Display in Fan-Window Contest.

Fourth-Prize Display in Fan-Window Contest.

Latest Approved Fittings

The electrical fittings illustrated and described in thic department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

CONDUIT BOXES.—The Adapti Manufacturing Company, 919 West Street, Cleveland, O.

Pressed-steel and cast-iron conduit boxes.

For use with rigid conduit, types 5400, 5500, 5600, 5700.

Listed August 26, 1915.

FIXTURES.—Faries Manufacturing Company, Decatur, Ill.

Straight electric, combination, and portable types.

Listed September 20, 1915.

FIXTURE PARTS. — Benjamin Electric Manufacturing Company, 120 South Sangamon Street, Chicago, Ill.

Fixture-supporting attachment for use with Benjamin ceiling fixtures and receptacles having threaded shade-holder shell. 660 watts, 250 volts, catalog No. 1412.

Listed October 12, 1915.

FIXTURES, Supports for. — The Elandee Construction Company, 4305 North Lawndale Avenue, Chicago, Ill.

This device consists of two steel crossbars provided with a fixture stud and locking nut, for use in old work with an outlet box or ceiling plate as a fixture support.

Listed October 2, 1915.

FUSELESS ATTACHMENT PLUGS.—Weber Electric Company, Schenectady, N. Y.

Non-separable attachment plugs.

660 watts, 250 volts, catalog No. UL120 with keyless socket.

250 watts, 250 volts, catalog Nos. UK120 with key socket; UP120 with pull socket.

Listed September 29, 1915.

HEATERS, Electric.—General Electric Company, Schenectady, N. Y.

"G. E." heaters, 95-250 volts.

Toasters, 550-3,500 watts, types D-72, D-73.

Radiant grills, 600 watts, type D-70.

Ranges, 3.600-4,600 watts, types R-2, R-2S, R-3, S-1.

Air heaters, 1,200-5,000 watts, type A-53.

Individual contact plugs, catalog Nos. 173019-20 for use with "G. E." heaters.

Listed September 15, 1915.

HEATERS, Electric.—Premier Electric Company, Cuyler and Ravenswood Avenues, Chicago, Ill.

Automatic electric vulcanizer.

This device consists of a case inclosing a heating element and thermostatic cutout with push button. A base, stand, hooks, chains, length of portable cord and attachment plug complete the outfit. Premier, 6 amperes, 110 volts.

Listed October 12, 1915.

HEATERS, Electric.—Simplex Electric Heating Company, Cambridge, Mass.

Simplex, 100-250 volts.

Coffee pots, percolaters, and tea kettles, 83-500 watts, catalog Nos. 1227-28, 1326-27-28-34, 1337-1340 inclusive, 1344, 1872-73.

Portable disk stoves and cooker combinations, 83-2700 watts, catalog Nos. 1710, 1749, 1757, 1760-61-74-87-87½-88-88½-94-94½.

Chafing dishes, 83-500 watts, catalog Nos. 1208C, 1218C.

Dining room sets, 500 watts, catalog Nos. 40-45 inclusive.

Listed August 23, 1915.

HEATERS, Electric.—Simplex Electric Heating Company, Cambridge, Mass.

Simplex, 100-250 volts.

Combination disk heaters, 500-1,935 watts, catalog Nos. 2048, 2050-2057 inclusive.

Food warmers, 170-400 watts, catalog Nos. 1302-03, 1306-1309 inclusive, 1311-1316 inclusive.

Supporting Attachment for Fixtures.—Benjamin Electric Manufacturing Company.

Broilers and griddles, 300-3,300 watts, catalog Nos. 1184-1187 inclusive, 1415-16-17-22-22½-23-24-27-28.

Fry kettles, 850-2,400 watts, catalog Nos. 1410-1413 inclusive.

Plate warmers, 300-400 watts, catalog Nos. 1661-1662.

Hot closets, 200-1,200 watts, catalog Nos. 1621-1623 inclusive.

Toasters, household and hotel types, 250-1,700 watts, catalog Nos. 211, 213, 1419, 1420.

Urns, 83-4,500 watts, catalog Nos. 412-415 inclusive, 417, 418.

Ovens, household type, 366-2,400 watts, catalog Nos. 1605-06.

Ovens, large baking, 1,500-10,000 watts, catalog Nos. 152, 154, 156, 158.

Listed August 24, 1915.

HEATERS, Electric.—Simplex Electric Heating Company, Cambridge, Mass.

Simplex, 100-250 volts.

Ranges, maximum capacity 2,475-8,175 watts, catalog Nos. 4K-15K inclusive, 21K-24K inclusive, 31K-34K inclusive (catalog Nos. 6K, 7K, 8K, 21K, 22K, 23K, 31K, 32K, 33K are standard when provided with a 30-ampere, 250-volt main line switch only when they are also provided with a switch preventing simultaneous operation of broiler and oven).

Listed September 15, 1915.

INSULATING MATERIALS.—Delaware Hard Fibre Company, Wilmington, Del.

Fiber for insulating purposes.

This material is furnished in sheets and tubes of various thickness in red, black, yellow and gray colors.

Laboratories' tests show that this material has fair dielectric strength. Its tensile strength, toughness, flexibility and uniformity of thickness are such as to make it suitable for use in pieces of small size in electric fittings. It is absorptive of moisture to about the same degree as all ordinary fiber of its class. Its properties are but little changed by exposure to temperatures below 250 degrees Fahrenheit. It burns at from 525 to 540 degrees.

While insulating material of this general type is not classed as either non-absorptive or non-combustible and should, therefore, not in general be used as a substitute for materials so classed, this fiber is judged suitable for crossbars, washers, bushings and other small parts of electrical fittings where use of fiber has been recognized.

Manufacturers desiring to use this material should submit samples in commercial form for tests.

Listed October 2, 1915.

MISCELLANEOUS. — Electric Products Company, 1069 East 152nd Street, Cleveland, O.

Watton battery chargers.

Automatic types R-20, R-30, R-45, RE-20, RE-30, RE-45, RR-20, RR-30, RR-45, RRE-20, RRE-30, RRE-45.

Non-automatic types, CN, CNC.

Listed August 26, 1915.

MOLDING. — Connecticut Electric Manufacturing Company, Bridgeport, Conn.

C. E. M. metal molding.

Listed September 3, 1915.

MUSICAL INSTRUMENTS.—Estey Organ Company, Brattleboro, Vt.

Electric action for pipe organs.

A 10-volt, self-excited, ungrounded generator belted to the blower motor sends current through a series of manually or automatically operated switches in console and corresponding magnets in organ controlling air valves. The generator is fused at the terminals with standard fuses. Standard rubber-covered wire from generator, special cotton-insulated cables from console to organ, are all inclosed in rigid conduit installed by manufacturer.

The electrical portions of this equip-

ment are judged to be as well safeguarded as can be demanded in an instrument of this type.

Before installation the Inspection Department having jurisdiction should be consulted.

Listed October 1, 1915.

PICTURE MACHINES AND APPLIANCES. — Ad-Display Machine Corporation, Richmond, Va.

Automatic moving slide machine.

This device consists of an arc lamp arranged for projecting purposes, and a motor-operated, slide-handling apparatus for placing and removing glass picture slides from in front of lamp. The entire equipment is mounted on a cast-iron stand.

Direct-current motor: Robbins & Myers Company, 140 horsepower, 115 volts.

Listed October 2, 1915.

PICTURE MACHINES AND APPLIANCES.—The Phantoscope Manufacturing Company, Bond Building, Washington, D. C.

"Graphoscope" motion-picture machine, equipped with driving motor and mechanical speed controller. This machine employes a three-carbon arc lamp, and a right-angle prism, through which light is refracted in machine head.

Listed October 12, 1915.

RECEPTACLES, For Attachment Plugs. — Simplex Electric Heating Company, Cambridge, Mass.

Simplex receptacles.

Surface type.

15 amperes, 250 volts. 25 amperes, 125 volts.

Single-heat: catalog No. 851; receptacle only, catalog No. 861; plug only, catalog No. 871.

Three-heat: catalog Nos. 853-S and 853-T; receptacles only, catalog Nos. 863-S and 863-T.

Flush type.

15 amperes, 250 volts; 25 amperes, 125 volts.

Single-heat: catalog Nos. 960 and 961; receptacles only, catalog Nos. 963 and 964; plug only, catalog No. 962.

Listed August 13, 1915.

RECEPTACLES, For Attachment Plugs. — Union Electric Company, Trenton, N. J.

Union flush receptacles.

Edison type, 660 watts, 250 volts, catalog No. 754.

Listed September 3, 1915.

RECEPTACLES, Standard. — The Connecticut Electric Manufacturing Company, Bridgeport, Conn.

Porcelain shell C. E. M. Co.

Keyless, 660 watts, 250 volts, catalog Nos. 2746-47, 2758, 9001.

Listed August 28, 1915.

RECEPTACLES, Standard.—Weber Electric Company, Schenectady, N. Y.

Porcelain shell.

Key, 250 watts, 250 volts, catalog Nos. PK321 (1,728), PK322 (1,731), PK323 (1,734), PK324 (1,737), PK325 (1,740), PK326 (1,743), PK327 (1,746), PK328 (1,749), PK329 (1,752), PK330 (1,755), PK331 (1,758), PK332 (1,761), PK333 (1,764), PK334 (1,767), PK337 (1,770), PK339 (1,773).

Keyless, 660 watts, 250 volts, catalog Nos. 1,504, 4,000, 4,001, 4,002, 4,013, 9,402, 9,403, 28,795, 50,715, 61,000, 61,001, 61,230, 61,231, 61,329, 61,330, PL321 (1,729), PL322 (1,732), PL323 (1,735), PL324 (1,738), PL325 (1,741), PL326 (1,744), PL327 (1,747), PL328 (1,750), PL329 (1,753), PL330 (1,756), PL331 (1,759), PL332 (1,762), PL333 (1,765), PL334 (1,768), PL337 (1,771), PL339 (1,774).

Fifteen hundred watts, 600 volts, catalog Nos. 1,422, 1,423.

Pull, 250 watts, 250 volts, catalog Nos. PP321 (1,730), PP322 (1,733), PP323 (1,736), PP324 (1,739), PP325 (1,742), PP326 (1,745), PP327 (1,748), PP328 (1,751), PP329 (1,754), PP330 (1,757), PP331 (1,760), PP332 (1,763), PP333 (1,766), PP334 (1,769), PP337 (1,772), PP339 (1,775).

Listed October 9, 1915.

RECEPTACLES, Weatherproof.—The Connecticut Electric Manufacturing Company, Bridgeport, Conn.

C. E. M. Co., 660 watts, 250 volts.

Cleat type, catalog No. 2748.

Listed August 28, 1915.

RECEPTACLES, Weatherproof.—Weber Electric Company, Schenectady, N. Y.

Weber, 660 watts, 250 volts.

Cleat type, catalog No. 59275.

Listed October 13, 1915.

RHEOSTATS.—Industrial Controller Company, Milwaukee, Wis.

Automatic starters, 1 to 15 horsepower, 110 and 220 volts.

Bulletin Nos. 7110, 7115, 7305.

Listed September 4, 1915.

RHEOSTATS. — Pawling & Harnischfeger, Thirty-eighth and National Avenues, Milwaukee, Wis.

Drum controllers, types R, S, U, UC, V.

Listed October 2, 1915.

ROSETTES, Fuseless. — The Connecticut Electric Manufacturing Company, Bridgeport, Conn.

C. E. M. Co., 3 amperes, 250 volts.

Combines cleat and concealed, catalog Nos. 2693-B, 2694-B, 2695-B.

Listed August 28, 1915.

SOCKETS, Standard.—The Electrical Manufacturing Company, 1951 Lawrence Street, Denver, Colo.

New England all-porcelain pendant, consisting of a one-piece porcelain shell containing removable switch body and attached screw shell.

Key, 250 watts, 250 volts, catalog No. 1938.

Listed August 30, 1915.

SOCKETS, Standard.—Weber Electric Company, Schenectady, N. Y.

Porcelain shell.

Key, 250 watts, 250 volts, catalog Nos. PK301(1701), PK302(1704), PK303 (1707), PK303½(1710), PK304½(1713), PK309½(1716), PK310½(1719), PK317 (1722), PK318(1725).

Keyless, 660 watts, 250 volts, catalog Nos. PL301(1702), PL302(1705), PL303 (1708), PL303½(1711), PL304½(1714), PL309½(1717), PL310½(1720), PL317 (1723), PL318(1726).

Pull, 250 watts, 250 volts, catalog Nos. PP301(1703), PP302(1706), PP303 (1709), PP303½(1712), PP304½(1715), PP309½(1718), PP310½(1721), PP317 (1724), PP318(1727).

Listed October 11, 1915.

SWITCHES, Automatic.—The Automatic Refrigerating Company, Capitol Avenue and Willow Street, Hartford, Conn.

A thermostatic switch for remote control of motor starters operating refrigerating systems and designed to maintain temperature of cold-storage rooms within predetermined limits.

Standard for use with standard direct-current and alternating-current self-starters of the Cutler-Hammer Manufacturing Company.

The self-starters for use with this switch are for 550 volts or less and are provided with special current-limiting resistances in control circuits.

Listed October 12, 1915.

SWITCHES, Automatic.—The Cutler-Hammer Manfacturing Company, Milwaukee, Wis.

Crane-protecting panel, bulletin No. 10125.

Listed September 24, 1915.

SWITCHES, Oil-Break. — Condit Electrical Manufacturing Company, Boston, Mass.

Oil starter for alternating-current motors; a completely inclosed, three or four-pole, two-throw, oil-immersed switch used as a means whereby running fuses are out of circuit during starting process. In off position motor windings are disconnected from the line.

Type I, 250-600 volts; maximum amperes: 30; maximum horsepower: 10.

Oil switch for alternating-current motors or other alternating-current circuits; a completely inclosed, two, three or four-pole, single-throw oil-immersed switch. Non-automatic type: fused and fuseless. Automatic type with overload, no-voltage or shunt-trip attachments mounted on outside.

Type ID, 250-600 volts; maximum amperes: 50; maximum horsepower: 25.

Listed October 11, 1915.

SWITCHES, Push-Button Flush.—General Electric Company, Schenectady, N. Y.

Single-pole, 10 amperes, 125 volts, 5 amperes, 250 volts, catalog No. GE632.

Three-way, 10 amperes, 125 volts, 5 amperes, 250 volts, catalog No. GE634.

Also above types with lock attachment.

Listed August 30, 1915.

SWITCHES, Push-Button Flush.—The Hart & Hegeman Manufacturing Company, 342 Capitol Avenue, Hartford, Conn.

Single-pole, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog No. 4401.

Three-way, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog No. 4403.

Listed August 26, 1915.

SWITCHES, Surface-Snap. — The Arrow Electric Company, 103 Hawthorne Street, Hartford, Conn.

Arrow E.

With porcelain covers.

Double-pole, 10 amperes, 250 volts, catalog Nos. 6214, 6219.

Listed August 23, 1915.

SWITCHES, Surface Snap. — The Standard Electric Manufacturing Company, 551 West Washington Street, Chicago, Ill.

Double-pole, 10 amperes, 250 volts, catalog Nos. 3014-15, 4014-15.

Listed September 24, 1915.

SWITCHES, Surface Snap. — The Trumbull Electric Manufacturing Company, Plainville, Conn.

Double-pole, 10 amperes, 250 volts, catalog No. 7476.

Listed October 1, 1915.

Current Electrical News

ATLANTIC STATES.

MIDDLEBURY, VT.—It is announced that a syndicate composed of Charles H. Thompson, of Montpelier, and others will undertake the development of latent water powers in Middlebury, Vt. A water power on the East Middlebury River, which the syndicate is reported to have in view, is believed capable of developing 25,000 electric horsepower twenty-four hours a day throughout the year. The market in this region consists of sawmills and other industries. W.

BATAVIA, N. Y.—The city will vote on November 9 at a special election on the proposition to raise $175,000 for municipal improvements, including the rebuilding of the lighting plant. Address town clerk.

CORNING, N. Y.—The Lamoka Power Corporation has been organized to generate electricity, etc. The company is capitalized at $300,000. Incorporators: Hasell W. Baldwin, Robert G. Hayt, and E. L. Conklin.

NORRISTOWN, PA.—A large three-story brick, steel and concrete bottling house for the Adam Scheidt Brewing Company will soon be erected here. It is said that all machines will be electrically driven. Peuckert & Wunder, Philadelphia, Pa., are the architects.

PHILADELPHIA, PA.—A one-story stone edifice, to cost $250,000, will be erected at the corner of Twelfth and Chestnut Streets for the Beneficial Savings Fund Society. The electrical installation will be of the highest order. Horace Trumbauer, Philadelphia, Pa., is the architect.

WYOMISSING, PA.—The borough council is planning ways and means to install a $10,000 light system. Address borough clerk.

NORTH CENTRAL STATES.

EATON, O.—A large amount of electrical construction is called for by the plans of the Eaton Lighting Company, to extend its wires to Camden, O. Additional stock to the amount of $30,000 has been authorized for this purpose, and work is to begin as soon as possible, and be pushed to completion rapidly. L.

MASSILLON, O. — Ornamental lighting standards for a new viaduct will probably be installed by the county authorities, as the city has refused to take action on account of the structure lying outside of the city limits. It is estimated that twelve standards and lights, with the necessary wiring, can be installed complete for $600.

SANDUSKY, O.—In the issue of October 23 it was stated that a temporary injunction had been issued stopping work on the ornamental street-lighting system. The fact is that a temporary injunction had been granted property owners restraining the city from assessing and collecting from the abutting property owners 50 cents per month per foot frontage. The injunction in question has since been dissolved, the court holding that the city had a right to order such improvements and assess abutting property for the same. The white way installation has been completed for some time, and the city is paying the Sandusky Gas and Electric Company regularly every month for this service.

MANSFIELD, ILL.—The Mansfield Electric Company is reported to be planning the construction of a line to Bellflower, a distance of seven miles, and supply light to that village. A line may also be run to Mahomet.

ROCK FALLS, ILL.—An ordinance calling for an election to vote for a $5,000 bond issue for a municipal electric-light plant has been passed by the city council. Z.

ST. FRANCISVILLE, ILL.—The citizens have voted to issue bonds for the erection of new light plant. Address city clerk.

STREATOR, ILL.—An ordinance has passed the city council providing for $10,168.97 for boulevard lighting. Address city clerk.

MIDLAND, MICH.—The Consumers' Power Company has just purchased the property of the Bristol Electric Light Company, of Midland, assuming immediate control. The company will extend and enlarge the system and make changes in the street-lighting service.

NEENAH, WIS.—An ornamental system of street lighting is being agitated for this city's main thoroughfares. Address city clerk.

BOVEY, MINN.—The electric plant destroyed by fire will be rebuilt at once. Address town clerk.

BUTTERFIELD, MINN.—The sum of $8,000 in bonds has been voted for an electric-light plant. Address town clerk.

ELY, MINN.—The council may establish an electric-lighting system. Address village clerk.

KANAWHA, IOWA. — Bonds amounting to $15,000 have been voted for municipal lighting. Address town clerk.

NORTH M'GREGOR, IOWA.—The McGregor Electric Light and Power Company has asked for a franchise to furnish electric lights and power to Luana. Luana will hold a special franchise election on November 12.

OSAGE, IOWA.—Surveys are being made in connection with the installation of an electric light plant. Address town clerk.

KANSAS CITY, MO.—The entire equipment of machinery of the Ridenour Baker Grocery Company, a large wholesale house, will be operated by electricity. The building is now being erected; the motors have not been contracted for.

BUCKLIN, KANS.—The council will expend $10,000 for an electric-light plant. Address town clerk.

HARDINER, KANS.—Bonds have been voted by the city council for franchise for an electric-lighting system. Address city clerk.

LAWRENCE, KANS.—Lawrence has wanted a white way for some time, and it is now assured through the gift of $1,000 by the Lawrence Railway & Light Company towards the expense of the equipment. The total expense will be about $4,000, the remainder being raised by a special tax. M.

PRESTON, KANS.—Estimates are being prepared for a $7,000 electric light plant. Address town clerk.

ELGIN, N. D.—C. L. Rausen, of Holdingford, Minn., has just been granted a twenty-year franchise and will immediately begin the work of installing an electric lighting plant.

SOUTH CENTRAL STATES.

CAMDEN, TENN.—Wade Lowry and John D. Rice, of Camden, have purchased a site here, where they will build and equip a modern electric light plant. They have also acquired from J. S. Madrey all the existing poles, and wiring which belonged to the old plant that burned last spring. The new owners expect to have the new plant in operation by December 1. They will operate under the name of the Camden Electric Light Company.

FAIRHOPE, ALA.—The city contemplates acquiring water works and installing electric-light plant at estimated cost of $12,000. Address the mayor.

YELLVILLE, ARK.—W. C. Stephenson, of Marshall, who has organized a company known as the Yellville Light, Ice and Power Company, has been granted a franchise. Work will start about November 1 on the new electric-light plant.

EL CAMPO, TEX.—A complete system of electric street-lighting is to be constructed here. D.

PLAINVILLE, TEX.—The Malone Electric Power Company is engaged in wiring the towns of Hale Center and Abernathy for electric light and power. The company has just finished its high-tension wire line to Lubbock and is now furnishing light and power to that place from its plant in Plainville. Another line will soon be extended to Floydada and Crosbyton, and possibly to Ralls and Lorenzo.

PORT ARTHUR, TEX.—The Port Arthur Gas and Power Company, which has been organized here with a capital stock of $250,000, will construct an electric light and power plant. The incorporators are J. S. Connelly, S. B. Redmond and Edward S. Ellis. D.

SAN ANGELO, TEX.—Extensive improvements are to be made in the water and light plants of the San Angelo Water, Light and Power Company. About $50,000 will be spent within the next six months in improving.

SHERMAN, TEX.—The city commission has decided to call an election to vote on issuing $150,000 in bonds, part of which proceeds are to be used in making improvements to the electric-light plant. D.

TEMPLE, TEX.—The city water commissioners plan to substitute electric-driven pumps for steam power at the municipal pumping station. The proposed improvement will cost about $6,000. D.

WESTERN STATES.

GLASCOW, MONT.—The special election held here to vote on the issuance of $18,000 bonds for buying new equipment and enlarging the municipal electric-light plant, resulted in favor of the proposition by a substantial majority. Work will begin in the near future. U.

TERRY, MONT.—L. H. Gaffney has been granted a franchise by the town council for the installation and operation of an electric-light plant.

KEMMERER, WYO.—The town council is advertising for bids for the installation of a special street-lighting system, consisting of 12 posts, each equipped with five 100-watt lamps. Specifications covering the same may be obtained from John Mason, city clerk. U.

FORT COLLINS, COLO.—The city council is considering the installation of a special street-lighting system, information in regard to which may be obtained from the city clerk. U.

FREDERICK, COLO.—The city council has under consideration the installation of a special street-lighting system. Address the town clerk for information. U.

ALBION, IDAHO.—The $8,000 of bonds recently authorized have been sold. These bonds were issued for the purpose of installing an electric-light plant, and steps will soon be taken by the council for its installation. Information in regard to the same may be obtained from the city clerk. U.

BLACKFOOT, IDAHO.—The city council has employed Engineer James Young, of this city, to inspect several sites on the Blackfoot River which are under consideration for the location of a municipal electric light and power plant. He will also prepare plans and specifications for the proposed system. The chances look favorable that construction will be proceeded within the near future. U.

KENDRICK, IDAHO.—A certificate of public convenience and necessity has been granted to A. V. Dunkle by the Public Utilities Commission, at Boise, permitting him to install an electric-light and power plant in this city. The cost of the system is estimated at $8,000. U.

ROCKLAND, IDAHO.—M. R. Stipe, and J. E. March have filed an application for a certificate of public convenience and necessity with the Public Utilities Commission, at Boise, asking for permission to install an electric light and power plant to serve this village. U.

ROCKLAND, IDAHO—The public utilities commission, at Boise, has granted a certificate of convenience and necessity to G. H. Hodgin for the construction and operation of an electric-light plant for this village.

METALINE FALLS, WASH.—Hugh L. Cooper has applied to the Interior Department at Washington, D. C., for a preliminary permit, to begin work on the construction of a $10,000,000 power plant in "Z" Canyon, of the Pend O'Reille River, near this city. O.

LEBANON, ORE.—The light and power plant which was recently destroyed by fire is to be rebuilt at once by Scroggin & Washburn.

PILOT ROCK, ORE.—L. K. Harlan and J. B. Sparks have a plan for moving an electric-light plant to Pilot Rock from Lexington. The council has ordered an ordinance drawn granting a franchise to Mr. Harlan.

LOYALTON, CAL.—An ordinance has been passed providing for the issuance and redemption of bonds in the sum of $5,000 for the construction of an electric light and power plant.

FINANCIAL NOTES.

The American Light & Traction Company has sold to Bodell & Company, of Providence and Boston, $700,000 Consolidated Gas Company of New Jersey first-refunding five-per-cent bonds of April, 1965, recently authorized by the New Jersey Public Service Commission. These bonds are part of an authorized issue of $5,000,000 of which $1,000,000 are reserved to retire the first-mortgage five-per-cent bonds due in 1936 and are the first to be offered under the first and refunding mortgage. The company is controlled through the ownership of all its stock by American Light & Traction, and its property has been valued and its rates established by the New Jersey commission. It gives gas or electric service to seventeen towns on the Jersey coast serving a population of 52,000 and has net earnings of approximately $87,000 a year. The company was purchased by Emerson McMillin & Company in 1895 and acquired by American Light & Traction in 1902.

Dividends.

	Term	Rate	Payable
Boston Elev.	Q	$1.50	Nov. 15
Conn. Pw., pf.	Q	$1.50	Dec. 1
Conn. Ry. & Lt., com.	Q	1 %	Nov. 15
Conn. Ry & Lt., pf.	Q	1.75%	Nov. 15
Houghton Co. Elec. Lt., pf.	S	3 %	Nov. 1
Houghton Co. Elec. Lt., com.	S	2.5 %	Nov. 1
Mobile Elec.	Q	1.75%	Nov. 15
Monongahela Val. Trac., pf.	Q	1.25%	Nov. 2
Pacific Gas & Elec., first pf.	Q	$1.50	Nov. 15
Pacific Gas & Elec., orig. pf.	Q	$1.50	Nov. 15
J. G. White Eng. Corp., pf.	Q	1.75%	Dec. 1
J. G. White Management Corp., pf.	Q	1.75%	Dec. 1
J. G. White, Inc., pf.	Q	1.5 %	Dec. 1
Wash.-Va. Ry.	S	2.5 %	Nov. 1

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 18,951. ELECTRICS, BATTERIES, ETC.—An American consular officer in Brazil reports that an engineer in that country desires to represent American manufacturers of electric vehicles, storage batteries and supplies for generating and utilizing electrical power (not light).

NO. 18,981. ELECTRICAL APPLIANCES.—The Bureau is informed by an American consular officer in Australia that a business man in his district desires to secure the sole agency for a good line of American electrical appliances.

NO. 18,984. ELECTRICAL GOODS. The Bureau is informed by an American consular officer in India that a man in his district wishes to be supplied with catalogs, price lists, etc., of electrical goods, with the intention of becoming the sole representative of an American firm.

NO. 18,988. ELECTRIC APPARATUS, ETC.—An American consular officer in the Netherlands reports that a man in that country is interested in automobiles, electric apparatus, boat motors, motorcycles and supplies, and new inventions in the technical line. It is stated that the man desires to buy such goods for his own account and act as sole buying agent for Holland and colonies. He proposes to pay cash against documents in the Netherlands or cash in New York. Correspondence may be in English. References are given.

NO. 18,995. POCKET LAMPS.—An American consular officer in England reports that a firm in his district desires to be placed in communication with American manufacturers of advertising novelties and electrical pocket lamps.

NO. 19,002. LABORATORY SUPPLIES.—The Bureau is informed by an American consular officer in Siberia that a firm in his district desires the names and addresses of American manufacturers and exporters of laboratory accessories for schools, for chemical study, physical apparatus for general mechanic, hydrostatic, optic, magnetic and electrical experimentation. Catalogs and prices are requested. Correspondence should be in Russian.

NEW PUBLICATION.

CHICAGO AUTOMATIC TELEPHONE SYSTEM.—Kempster B. Miller, consulting telephone engineer to the City Council of Chicago, has submitted his "Report on the Automatic Telephone Situation in the City of Chicago." This reviews the history of the automatic telephone enterprise in the city, takes up the commercial aspects of the present auto-

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Nov. 1	Oct. 25
American Tel. & Tel. (New York)	124⅝	124½
Commonwealth Edison (Chicago)	140	134
Edison Electric Illuminating (Boston)	238	239
Electric Storage Battery common (Philadelphia)	72½	73
Electric Storage Battery preferred (Philadelphia)	72½	73
General Electric (New York)	181⅞	176½
Kings County Electric (New York)	120	120
Massachusetts Electric common (Boston)	7	7
Massachusetts Electric preferred (Boston)	40	42
National Carbon common (Chicago)	150	155
National Carbon preferred (Chicago)	121	120½
New England Telephone (Boston)	132½	134¾
Philadelphia Electric (Philadelphia)	27	26
Postal Telegraph and Cables common (New York)	79½	78
Postal Telegraph and Cables preferred (New York)	65	65¼
Western Union (New York)	80⅜	79⅝
Westinghouse common (New York)	72⅝	72¾
Westinghouse preferred (New York)	140	140

matic system and discusses its present usefulness, showing reasons for the financial failure of the present enterprise. It is generally claimed that the company has forfeited its franchise because of failure to serve over 20,000 subscribers. Possible courses open to the municipal authorities are discussed under five different propositions. Of these, I is ownership and operation by the city; II, ownership by city and operation by licensee; III, city to dismantle and dispose of plant; IV, non-forfeiture and operation by the Tunnel Company; V, Non-forfeiture and sale to American Telephone & Telegraph Company. Among the conclusions reached in the report is that any attempt to continue operation of the automatic system as a competing enterprise without connection to the system of the Chicago Telephone Company is not conducive to better or cheaper telephone service in the city.

PERSONAL MENTION.

MR. W. S. CAMPBELL, Lind, Wash., who for several years has been manager of the Washington Water Power and Light Company, of Spokane, in Lind, has resigned his position and retired to his ranch near Medford, Ore. A successor to Mr. Campbell has not been named to date.

MR. A. H. PURDY, the new president of the Kansas Public Service Association, started business life in 1888 in the office of the Topeka Edison Company. He had been born in Topeka and followed his natural inclination in seeking employment with this company. After a continuous service, with frequent promotions, he was made secretary and treasurer of the company in 1905 and general superintendent in 1910.

MR. GEORGE K. MILTENBERGER, of St. Louis, who has been stationed at Hickman, Ky., for several months in the capacity of local manager of the Public Service Company, which operates the city light and water plants, has been transferred to St. Louis. Doyle Jurney, who has been Mr. Miltenberger's assistant, is in charge of the property.

MR. JAMES BARTON BROKAW, manager of the Southern Idaho Water Power Company, and Miss Mary Gray Marston were married in New York City on November 3. Miss Marston has been the electric range expert for the General Electric Company for the past year in charge of its western campaign. She was formerly with Wells, Mowbray & Company, New York, the United Electric Light & Power Company, New York, the United Electric Company, Springfield, Mass., and the Edison Electric Illuminating Company, of Boston.

MR. NORMAN D. CRAWFORD has resigned as president and general manager of the Reading (Pa.) Transit and Light Company, operating traction lines and lighting properties in and about Reading, Norristown, Lebanon and other cities in Pennsylvania. Mr. Crawford went to Reading from Youngstown, O., about two years ago, where he was succeeded by R. P. Stevens as president of the Mahoning and Shenango Railway and Light Company. His plans for the future have not been announced, although he will continue his residence in Reading for the present. His successor will be named at a special meeting of the directors.

OBITUARY.

DR. PAUL RASEHORN, chief engineer of the Siemens & Halske Aktien-Gesellschaft, died at Berlin, Germany, on September 19, at the age of 50 years. Dr. Rasehorn had been identified especially with the development of the electrical measuring instruments made by this company, whose staff he joined in 1892.

MR. BRYANT JARVIS DAILY, manager of the Efficiency and Economy Department of National Lamp Works of the General Electric Company, died Friday, October 29, at his home in Cleveland. A blood clot on the brain was the immediate cause of death, and though his health had been impaired from this cause for over a year, he was attending to his duties and a complete recovery was expected.

DATES AHEAD.

Electric Power Club, Homestead Hotel, Hot Springs, Va., November 8-10. Secretary, C. H. Roth, 1410 West Adams Street, Chicago, Ill.

The Utilities Bureau Conference on valuation, Hotel Adelphia, Philadelphia, Pa., November 10-12. Acting director, M. L. Cooke, 1009 Finance Building, Philadelphia, Pa.

Mississippi Electric Association. Annual convention, Hattiesburg, Miss., November 12-13. Secretary, H. F. Wheeler, Hattiesburg, Miss.

Ohio Society of Mechanical, Electrical and Steam Engineers. Annual meeting, Zanesville, O., November 18 and 19. Secretary, Frank E. Sanborn, Ohio State University, Columbus, O.

American Society of Mechanical Engineers. Annual meeting, New York City, December 7-10. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York City.

National Independent Telephone Association. Annual convention, Hotel La Salle, Chicago, December 8-10. Secretary, F. B. MacKinnon, Washington, D. C.

With the Electrical Manufacturers

The Connecticut Electric Manufacturing Company, Bridgeport, Conn., is sending out little folders calling attention to its new approved nonbreakable Edison fuse plug, which is made of white horn fiber.

The Faultless Anchor Company, Fostoria, O., is sending out folders on its Faultless anchors. These are very ruggedly built to withstand heavy strains. The anchors are made with two, three or four fins and are well described and illustrated in the folders.

Sprague Electric Works of General Electric Company, New York City, has recently opened a sales office in the Provident Bank Building, Cincinnati, O., under the management of Frank H. Hill. The Cincinnati office has been established to facilitate the prompt and efficient handling of the increasing business in that section.

Lindsley Brothers Company, Minneapolis, Minn., announces the opening of a southwestern sales office at St. Louis, Mo., in charge of F. O. Grayson. The company has felt the necessity of giving its customers in the Southwest more intimate service, and the new sales office will handle business in Missouri, Kansas, Oklahoma, Texas, Arkansas, Louisiana, Tennessee and Southern Illinois.

The Barkelew Electric Manufacturing Company, Middletown, O., has issued catalog No. 22 on its knife switches and specialties. This covers 64 pages well illustrated with the company's great assortment of standard and special knife switches, motor-starting switches, quick-break and field-discharge switches, disconnecting switches, switch parts, fuses, wire brushes, etc. A very complete index is given at the back of the book.

Holophane Works of General Electric Company, Cleveland, O., has issued several new booklets dealing with its new Regent glass. One of these described this type of illuminating glassware. Another (catalog No. 500) is devoted to the many designs of roughed and etched shades. Still another shows the colored decorations on type GC Regent shades. There has also been issued a booklet of corrections and additions applicable to Holophane catalog No. 711.

Kuhlman Electric Company, Bay City, Mich., celebrated the formal opening of its handsome and commodious new factory at Bay City by means of a concert on the evening of October 28 given by the Thirty-third Regiment Band. The buildings were thrown open to inspection by the citizens, who were conducted through the establishment and informed on the construction of Kuhlman transformers. The Bay City Board of Commerce took a prominent part in the ceremonies.

The Globe Stove & Range Company's electric ranges and cooking appliances are being featured in a strong electric cooking campaign inaugurated on October 28 by the Scranton Electric Company, of Scranton, Pa. This progressive central station offers

a three-cent cooking rate. The attractive features of the Globe Electrics are making a most favorable impression on visitors to the Scranton company's show rooms. The Globe Stove & Range Company, Kokomo, Ind., is preparing to assist other central stations in similar campaigns.

The General Electric Company, Limited, 67 Queen Victoria Street, London, E. C., England, has issued the fourteenth edition of its general catalog of electric light fittings. The catalog contains 68 large pages with a multitude of illustrations of fixture parts and accessories, lamp guards, switch boxes and switch plates, Striplite and other fixtures, electric signs, street lighting and other outdoor fixtures and posts, ship, mill and other waterproof fixtures, handlamps, steel reflectors and a large variety of glassware, including reflectors,, bowls, shades, globes, also silk shades.

Sprague Electric Works of General Electric Company, 527 West Thirty-fourth Street, New York City, has ready two new bulletins on ozonators. No. 49,126 is devoted to ozonators for cold-storage warehouses. The use of ozone has been found very beneficial in such places for preventing cross tainting and eliminating odors from perishable goods. These equipments are mounted on trucks to permit bringing the apparatus to any room needed. The bulletin is well illustrated. Bulletin No. 49,127 deals with ozonators for use in stores. The installation in the department store of Lit Brothers, Philadelphia, is described and illustrated.

Western Electric Company, New York City, is making special offers to appliance dealers on the Western Electric Junior range. This outfit is a complete but small size electric range, particularly suitable as a holiday gift to little girls who like to learn to cook and bake. The company is making a strong campaign on this novel appliance and expects that 50,000 of these ranges will be sold before Christmas. Several circulars relative to the utility of this new electrical toy for girls "playing house," to its value as a central-station load, and to the strong advertising campaign on the device have been prepared by the company to stimulate the interest of dealers.

Record of Electrical Patents

Issued by the United States Patent Office, October 26, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,157,663. Automatic Circuit-Control Apparatus. M. Barron, Rogers, Tex. Electromagnetically operated switching mechanism.

1,157,672. Illuminated Sign. R. O. Brittain, Boston, Mass. Slotted gears act as shutters for perforations in opaque casing to alternately shut off the light and permit it to shine.

1,157,687. Branding Iron. J. C. Garner and W. Gutman, Detroit, Mich. Electrically heated.

1,157,690. Starter for Internal-Combustion Motors. A. L. Golden, Oakland, Cal. Igniter circuit interlocked with valves.

1,157,691. Electric Furnace. S. Guggenheim, Berlin-Wilmersdorf, Germany. For use on three-phase circuit.

1,157,694. Process of Insulating Wire. O. T. Hungerford, Belleville, N. J. For applying insulating compound to fabric-covered wires.

1,157,696. Ignition System. L. D. Kellogg, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Details of circuit arrangements.

1,157,701. Reflector-Lamp. F. Kratz, assignor to firm of Robert Bosch, Stuttgart, Germany. Lamp movably supported to permit insertion and removal through opening in rear of reflector.

1,157,702. Catenary Suspension of the Trolley Wire for Electric Railways. F. Lautenbacher, Munich, Germany. Manner of suspending trolley wire from messenger.

1,157,714. Keyboard for Telegraph Transmitters. C. E. Nelson, Wilkinsburg, Pa. Depression of one key locks adjacent keys against depression.

1,157,723. Apparatus for Controlling Railway Trains. J. O. Query, Somerville, Mass. Track trip is electrically controlled.

1,157,730. Static Frequency-Changer. F. Spinelli, Milan, Italy. Transformers for transforming three-phase currrent into single-phase current of treble frequency.

1,157,731. Electric Cooking Apparatus. R. Sprenger, assignor to General Electric Co., Schenectady, N. Y. Electrically heated plate yieldingly supports cooking utensil, circuit being broken on removal of utensil.

1,157,732. Knickdown Lamp Stand and Shade. W. P. Stephenson, Windsor, Ont., Canada. Particular structure of table or floor lamp.

1,157,740. Controlling Mechanism for Printing Presses. J. J. Walser and C. A. Dresser, assignors to Goss Printing Press Co., Chicago, Ill. Arrangement of motors and gearing for high-speed and low-speed control.

1,157,744. Combined Lamp and Horn. P. B. Whitney, assignor to Mesinger-Whitney Electric Co., New York, N. Y. Lamp-enveloping shell acts as resonating chamber for electromagnetic horn. (See cut.)

1,157,745. Automatic Telephone System. R. S. Wilbur, assignor to Western Electric Co., Chicago, Ill. Side switches controlling the actuating connections of automatic switch mechanisms are controlled over trunk wires independent of voice-current wires.

1,157,746. Telephone System. C. S. Winston, assignor to Kellogg Switchboard & Supply Co. Arrangement of link circuits.

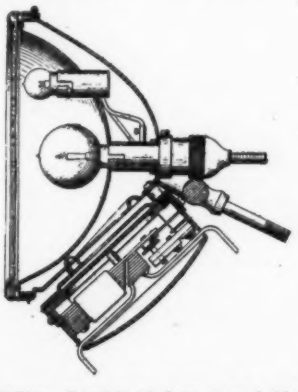
1,157,748. Vehicle Lighting System. H. L. Wohlers, Oak Harbor, O. Mounting and gearing of generator driven from vehicle wheel hub.

1,157,765. Electric Lighting Fixture. W. W. Dean, assignor to Benjamin Electric Mfg. Co., Chicago, Ill. Special lamp socket for illuminating instrument dial on automobile dash.

1,157,771. Smoking Pipe. W. H. Fulton, New York, N. Y. Bowl is fitted with tobacco-igniting electric conductor.

1,157,777. Control System. A. J. Hall, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Electropneumatically operated multiple-unit train control.

1,157,779. Means for Suppressing the Resistance of the Negative-Electrode Flame in Vapor Electric Apparatus. P. C. Hewitt, assignor to Cooper Hewitt Electric Co., Hoboken, N. J. Mercury-vapor tube has solid anode in horizontal extension and mercury cathode in main chamber, the extension having its axis parallel to the cathode surface.



No. 1,157,744.—Combined Lamp and Horn.

1,157,782. Winding Switch for Self-Winding Clocks. E. A. Hummel, assignor to A. L. Haman, St. Paul, Minn. Particular structure of contacting device.

1,157,803. Motor Vehicle. L. S. Pfouts, Canton, O. Mounting and gearing of motor.

1,157,804. Starting Device for Mercury-Vapor Apparatus. J. C. Pole, assignor to Cooper Hewitt Electric Co. Electromagnetic tilting device.

1,157,819. Electric Furnace. E. Stassano, Turin, Italy. Arrangement for mounting the electrodes.

1,157,820. System of Control. N. W. Storer, assignor to Westinghouse Electric & Mfg. Co. Relates to details of pneumatic apparatus in electropneumatic train control.

1,157,821. System of Control. N. W. Storer and A. J. Hall, assignors to Westinghouse Electric & Mfg. Co. Electropneumatically operated reversing and field control switch.

1,157,823 and 1,157,824. System of Car Operation by Vapor Converters. P. H. Thomas, assignor to Cooper Hewitt Electric Co. First patent: accelerating direct-current voltage varied by step-by-step variation of voltage on alternating-current side. Second patent: steady rectified voltage produced from three-phase supply.

1,157,830. Electrolytic Refining of Tin. R. L. Whitehead, assignor to Americaan Smelting & Refining Co., Maurer, N. J. From impure tin containing lead.

1,157,839. Telegraphy. B. L. Bobroff, assignor to Universal Indicator Co., Milwaukee, Wis. "In" and "out" annunciator.

1,157,845. Signal System. C. W. Coleman, assignor to Hall Switch & Signal Co., New York, N. Y. Block system for double-track roads.

1,157,850. Traffic-Controlling System for Railways. A. V. T. Day, assignor to Hall Switch & Signal Co. Signal system having alternating track circuit controlling signal relay through amplifying apparatus consisting of concatenated generators.

1,157,856. Letter Plate. J. C. Eubank, Chicago, Ill. Glass inclosed lamp bank for electric talking sign.

1,157,859. Ozone-Generator. W. O. Freet, Hackensack, N. J., assignor to Steynis Ozone Co. Particular structure and arrangement of electrodes in air-tight box.

1,157,863. Combined Burglar-Alarm and Lock. A. Hamelin, assignor of one-half to Hamlau's Patents Co., Montreal, Que., Canada. Latch and staple permit slight movement of door which closes alarm circuit.

1,157,881. Machine Switching Telephone System. F. R. McBerty, assignor to Western Electric Co. Registering and controlling equipment for semi-automatic exchange.

1,157,904. Controller for Electric Motors. L. G. Riley, assignor to Westinghouse Electric & Mfg. Co. Interlocking arrangement between resistance-controlling drum and combined reversing and field-controlling drum.

1,157,912. Commutator. H. W. Turner, assignor to General Electric Co. Bars insulated by metal sheets coated with insulating enamel.

1,157,916. Insulated Wire and Terminal Therefor. A. M. Wentworth, assignor to General Electric Co. Method of making sheathed or "concentric" wire having an enlarged terminal, from ingot comprising copper imbedded in insulation surrounded by metallic sheath.

1,157,919. Electric Cutout. W. C. Arsem, assignor to General Electric Co. Inclosed fuse having fuse element surrounded by loose, dry particles of silicic acid.

1,157,921. Coupling. W. C. Banks, assignor to N.-W. Equipment Co., New York, N. Y. Insulated mechanical shaft coupling between motor and driven machine.

1,157,922. Water-Power Plant. E. Bassett, Shelbyville, Ind. Electrically controlled pneumatic devices for raising and lowering water wheel.

1,157,923. Electric Permutation-Switch Mechanism. O. D. Bowers, Arcanum, O. Comprises special means for preventing undesired connections to be made between a controller and its operating means.

1,157,925. Vacuum-Tube Electrode and Process of Operating Same. W. D. Cool-

idge, assignor to General Electric Co. Relates to X-ray target of copper and tungsten.

1,157,926. Electric Meter. A. G. Davis, assignor to General Electric Co. Resistance arranged in connection with sectional potential coil in series with armature so that friction-compensating current may be varied while maintaining ampere-turns of coil constant.

1,157,930. Mechanism for the Control of Circuit-Breakers. L. L. Elden, assignor to General Electric Co. Automatic circuit-breaker with provision preventing it being held closed on overload.

1,157,937. Electric Meter. M. Helm, assignor to General Electric Co. Multiple-rate, plural-circuit meter.

1,157,945. Electric Motor. N. D. Levin, assignor to Jeffrey Mfg. Co., Columbus, O. Special arrangement of ball bearings and lubrication.

1,157,948. Alternating-Current Commutator Machinery. H. Meyer-Delius, assignor to General Electric Co. Excitation of machine through transformer and interpoles.

1,157,949. Electric-Alarm Mail Box. B. D. Miller, assignor of six-tenths to E. S. Landes, W. B. Bryson, P. C. Given and G. H. Kepple, Wooster, O. Alarm circuit controlled by lid.

1,157,955. Electric Regulator. G. S. Neeley, assignor to General Electric Co. Electromagnetic control of generator in storage-battery system.

1,157,960. Time-Controller. H. B. Post, assignor of one-half to W. P. Allen, Ardmore, Pa. Dashpot arrangement for timing contacts.

1,157,963. Control Mechanism. E. T. Shaw, assignor to General Electric Co. Brush-shifting arrangement controlling speed of motor in one direction and biased to reverse with switch opening motor circuit when brushes are moved to reverse.

1,157,966. Headlight. R. G. Standerwick, assignor to General Electric Co. Lamp support for headlight.

1,157,970. Dynamo-Electric Machine. J. B. Wiard, assignor to General Electric Co. Comprises special structure of centrifugal switch.

1,157,981. Apparatus for Delivering Mail. W. J. Griffiths, assignor to Electric Mail Carrier Co., New York, N. Y. Automatically controlled electrical carrier system.

1,157,990. Electric Signal. C. H. Light, assignor of one-half to E. Rudnich, Manning, Iowa. For indicating the separation of detachable hose sections.

1,157,995. Incandescent Lamp. G. M. J. Mackay, assignor to General Electric Co. Filament in superposed coils proportioned to operate at same temperature.

1,158,001. Automatic Voltage-Regulator. G. S. Neeley, assignor to General Electric Co. Arrangement of coils in electromagnetic resistance-controlling device.

1,158,029. Fluid-Pressure Device. C. Dantsizen, assignor to General Electric Co. Fluid-pressure cylinder operating electrode controlled by current through electrode.

1,158,037. System of Electrical Distribution. E. Evans, assignor to General Electric Co. Device responsive to current in both power and lighting circuits limits current to lighting when combined demand is excessive.

1,158,052. Rheostat. A. J. Horton, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Special structure of lamp dimmer.

1,158,060. Electric Switch. C. J. Klein, assignor to Cutler-Hammer Mfg. Co. Double push-button snap switch.

1,158,064. Electric Elevator Door-Operating Device. C. D. Lawrence, Youngstown, O. Electromagnets operating doors and latch are controlled by switch on car.

1,158,081. Electric Pocket Lamp. J. Stock, assignor to Interstate Electric Novelty Co., New York, N. Y. Special arrangement of battery, lamp, circuit-closer, etc., in tubular flashlight.

1,158,083. Direction-Indicator. H. E. Stout, Toledo, O. Particular structure of selective switch.

1,158,086. Circuit-Interrupter. J. A. Vahey, Boston, Mass. Variable by connecting one or more segments of commutator in circuit by plugging to collector ring.

1,158,091. Electrical Transformer-Controller and Distributer. F. L. Wiltshire, assignor to Martinsville Ignition Co., Martinsville, Ind. Particular structure for engine ignition systems.

1,158,103. Party-Line Ringing System. C. C. Bradbury, assignor to Kellogg Switchboard & Supply Co. Arrangement of cord circuit, ringing key, supervisory relay, etc.

1,158,105. Insulating Tube. E. F. Callender, assignor of one-half to L. B. Callender, Galesburg, Ill. Porcelain tube has tapered body with head at small end and tapered fins extending from head to middle of tube.

1,158,112. Detector for Oscillating Currents. W. E. Beakes, assignor to S. M. Kinter, Pittsburgh, Pa., and H. M. Barrett, Bloomfield, N. J. Comprises contact joint between antimony and ferro-silicon.

1,158,113. Electroller. R. B. Benjamin, assignor to Benjamin Electric Mfg. Co., Chicago, Ill. For securing on end of conduit and comprising central circuit-distributing structure and pull switches controlling lamps at ends of radial arms.

1,158,123. Apparatus for Generating and Receiving Electromagnetic Waves. R. A. Fessenden, assignor to S. M. Kinter and H. M. Barrett. Has tuned antenna and oscillating circuits with provision for simultaneously and equally varying their periods.

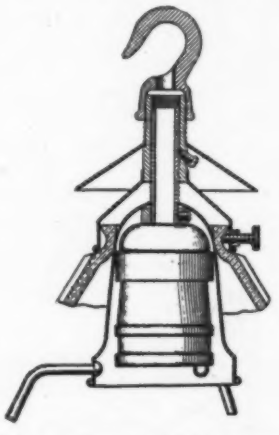
1,158,124. Signaling Apparatus for Aerial Navigation. R. A. Fessenden, assignor to S. M. Kinter and H. M. Barrett. For wireless communication air craft has a number of receiving and radiating-capacity areas, wave-generating apparatus and signal-receiving devices.

1,158,143. Electric Signaling System. C. P. Nachod, assignor to Nachod Signal Co., New York, N. Y. Train-controlled, electromagnetically operated, step-by-step semaphore mechanism in block system.

1,158,145. Electrical Fuse-Plug. N. W. Nutt, assignor to Trenton Electric & Conduit Co., Trenton, N. J. Particular two-part structure.

1,158,146. Electric Burglar, Fire and General Alarm. H. W. Olney, Spokane, Wash. Relay controlling alarm circuit is controlled by normally closed circuit-closers at danger points and has a resetting circuit.

1,158,149. Insulator Support. C. L. Peirce, Pittsburgh, Pa. Insulator-receiving thimble formed by helical wire mounted on end of stem.



No. 1,158,286.—Lighting Fixture.

1,158,171. Method of Cementing Carbon Articles. J. W. Brown, assignor to National Carbon Co., Cleveland, O. Manner of compacting baked carbon with carbonaceous binder consists in impregnating it with tar and causing the particles to flow and be cemented together by placing it under pressure and passing an electric current.

1,158,176. Electric Cooking-Stove. A. O. Christensen, Franklin, N. J. Arrangement of heating coils, connections and heat insulation.

1,158,184. Electric-Fan-Guard Attachment. T. G. Dabney, Clarksdale, Miss. Handle for attachment to central disk or ring.

1,158,191. Indicating Device for Telemeters. O. Eppenstein, assignor to firm of Carl Zeiss, Jena, Germany. Wheatstone-bridge arrangement for operating indicator is adjusted by device for bringing into desired relation two images of object whose distance is to be measured.

1,158,200. Pull Socket. J. G. Girling, assignor to Arrow Electric Co., Hartford, Conn. Smooth, flexible, insulating cord extends from switch through side of porcelain casing and connects to pull chain, insulating the latter and producing smooth, quiet operation.

1,158,203. Under-Contact Rail and Support. A. Gollos, Chicago, Ill., assignor to Gollos Railway Signal Co. of America. Support and protection of inverted third rail.

1,158,205. Process of Treating Hydrocarbon Oils. T. T. Gray, Elizabeth, N. J. Subjected to oxidizing agent in presence of ultra-violet rays from quartz lamps.

1,158,215. Roller-Bearing Current-Collector. R. E. Hewitt, Alameda, and W. W. Whitmore, Oakland, Cal. Roller-bearing mounting of cylindrical shell on shaft with special lubricating provisions.

1,158,221. Party-Line Telephone System. H. Hovland, assignor to Automatic Electric Co., Chicago, Ill. Parties on line may call each other by currents of different characters, with ring-back.

1,158,222. Spark Plug. H. M. Howard and J. A. McHardy, Providence, R. I. Grounded electrode is wire loop passing over end of central electrode, the latter being longitudinally adjustable.

1,158,233. Automatic Position-Indicator for Guns. W. D. Kilroy, Chiswick, England. To protect guns from injuring each other, models copy their movements and control electrically operated signal indicating dangerous relative positions.

1,158,243. Transmission Apparatus. A. B. Lakey, South Bethlehem, and E. E. Ross, Philadelphia, Pa. Alternating-current rotor on driving shaft and squirrel cage on driven shaft surrounded by stators having a single squirrel cage.

1,158,253. Process of Dehydrating Oil. F. W. McNear, Menlo Park, and P. E. Bowles, Jr., Reward, Cal. Oil and water separated from emulsion by passing alternating current through, thereby forming short-circuit of water globules and generating steam by heat produced.

1,158,255. Automatic Stop for Elevators. P. L. Manlet, St. Paul, Minn. Frangible device at end of car travel opens motor circuit and sets brake.

1,158,281. Speedometer. A. F. Poole, Chicago, Ill. Sparks associated with pointer rotated proportionally to speed of shaft occur after certain time interval, position of spark indicating speed.

1,158,286. Electric Lighting Fixture. J. D. Raymond, Chicago, Ill. Suspension device for shade-holder, lamp socket, socket cover and bowl hanger. (See cut.)

1,158,303. Internal-Combustion Pump. W. Schafer, San Francisco, Cal. Igniting means controlled by pressure in explosion chamber.

1,158,309. Transmitter for Wireless Telegraphy. C. Schou, Holte, Denmark. Relays retained by residual magnetism and released by relatively weak currents have signal currents from the transmitter distributed to them.

1,158,333. Stabilizer for Aeroplanes. A. B. Thaw, Pittsburgh, Pa. Righting members driven by wind motor, electromechanical connections being controlled by self-leveling circuit-closers.

1,158,346. Outlet Hood for Conduits. W. M. Webb, assignor to H. T. Paiste Co., Philadelphia, Pa. Provides overhang at end of conduit to keep out moisture.

1,158,355. Pedal Switch. W. S. Willis, New York, N. Y. For automobile signal device; mounted under floor and moved by foot-operated plunger.

1,158,375. Submarine Telegraphy. K. C. Cox, Norfolk Island. Selenium relay has selenium cells, inductance, resistance, etc., arranged on Wheatstone bridge plan.

1,158,397. Automatic Time Lighting Mechanism. H. E. Warren, assignor to Lombard Governor Co., Ashland, Mass. Circuit-closer operated by clock-driven cams.

Patents Expired.

The following United States electrical patents expired on November 1, 1915:

613,248. Incandescent-Electric-Lamp Holder. G. W. Cook, Jr., Bloomfield, N. J.

613,293. Mechanism for Supporting Electric Arc Lamps. W. A. McCallum, Avondale, O.

613,301. Yoke for Railway Conduits. F. S. Pearson, Boston, Mass.

613,309. Electric Ignition Device for Internal-Combustion Engines. L. W. Ravenel, Paris, France.

613,348. Printing Telegraph. A. Wimshing, New York, N. Y.

613,357. Suspension for Electric-Railway Motors. W. Cooper, Cincinnati, O.

613,367. Electric Rotary Cutter. F. Gardner, Chicago, Ill.

613,406. Electric Car Lighting. W. Biddle, New York, N. Y.

613,418. Electric Railroad. C. L. Kemon, Pittsburgh, Pa.

613,420. Electric Vehicle. K. Knudsen, Chicago, Ill.

613,433. Electric-Railway System. L. B. Walkins, Springfield, Mass.

613,533. Telephone Box or Cabinet. J. Sparks, Santa Fe, N. M.

613,567. Block-Signaling Apparatus. P. T. Fogel, Allentown, Pa.

613,594. Electric Fuse-Wire Holder. W. D. Packard, Warren, Pa.

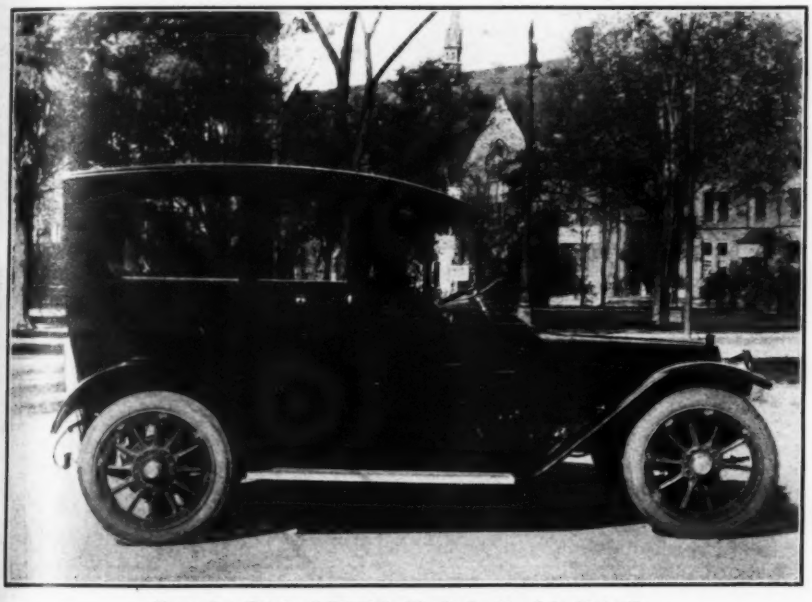
613,612. Electric-Railway System. L. B. Walkins, Springfield, Mass.

613,647. Insulator for Incandescent Electric Lamps. C. W. Brown, Boston, Mass.

Electric Vehicle Section

Electric Taxicabs in Detroit Reduce Operating Costs 40 Per Cent.

To the average patron of taxicab service the usual rates in effect, if not exorbitant, seem sufficiently high to net the operating company a very liberal return on the capital invested. As a matter of fact, however, there seems to be a well defined feeling among the taxicab companies throughout the country that unless some radical means of reducing the present high operating costs can be found, there will be no incentive to remain in the business.



One of a Fleet of Electric Taxicabs Used in Detroit.

It is perhaps not realized that the life of a well made gasoline car, costing from $2,000 to $2,500, is seldom over five years in taxicab service. This means that a company must replace its equipment every five years. Also, experience throughout the country has shown that from 40 to 50 per cent of the distances covered by the vehicles in regular service constitutes empty mileage. These conditions, together with other expenses inherent in gasoline-car operation has led to serious consideration on the part of taxicab companies of the electric vehicle.

In Detroit an electric service is being operated with remarkable results. The Detroit Taxicab & Transfer Company about two years ago experimented with the electric vehicle, and the results were so satisfactory that 12 cabs of this type were placed in service, and today the gasoline cars are being replaced as rapidly as the electric machines can be manufactured.

I. S. Scrimger, an executive of this company, in a paper before the recent convention of the Electric Vehicle Association of America, commented on his company's experiences as follows:

"In Detroit, we get 70 cents for our first mile and 40 cents for each additional mile; single-tariff meters being used. In other words, it doesn't make any difference as to the number of passengers carried, whether one or four—the capacity of the cab—the rate is the same. Comparative figures established between the Detroit Taxicab & Transfer Company and other companies in the United States show that the cost of operation per mile is between 30 and 35 cents. Taking the 30 cents per mile cost as the basis for figuring, if a cab covers two miles we receive $1.10. If the cab returns empty, we have covered a distance of 4 miles for which we have received $1.10. The cost per mile being 30 cents shows that we have lost on this run, and the history of the taxicab business throughout the United States is that from 40 to 50 per cent of our distances covered are empty mileage. The revenue obtained from service rendered in Detroit is about 33 cents a mile. You will, therefore, see that very little profit is to be made with an expense of between 30 and 35 cents a mile and an income of 33 cents a mile. It, therefore, became necessary that we obtain equipment that could be operated more cheaply than gasoline cabs.

"About two years ago we decided to build one electric cab as an experiment. Our first car was placed in service at the Hotel Pontchartrain at 2 o'clock in the afternoon, June 25, 1914, and up to the present time has been in continuous service about a year and three months.

"No advertising was done, nor an announcement of any kind made when this cab went into service. We thought it best to start the electric service, and allow the public to judge whether or not the electric cab would meet all requirements. It was only a short time when we commenced to receive letters of approval, and the cab met with such a signal success that we decided to build eleven more. These additional eleven electric cabs went into service last December and January, and have, therefore, been in service about eight months. We have just completed 15 additional electric cabs, and we have 20 more under way, which will be in service about the first of January. This will give us an equipment of 47 electric cabs.

"The public in Detroit has taken very kindly to our electric equipment; so much so, that we have had people wait from a half hour to three-quarters of an hour for the return of an electric cab, when we had gas cabs standing, which they might have used. We found, when trying to get an expression from the public before installing our electric cabs, that the public was not very favorably disposed toward the electric service. The most of the persons consulted seemed to have only a very meager idea as to how well an electric cab could be made to perform. I heard one gentleman say that he thought electric cars were designed and built for old ladies, and had he known our car was an electric before getting into it, would have declined to use the electric service. This same gentleman said we had not only converted him to the electric, but he was going to buy one for his wife if he could obtain

a car that would give as satisfactory results as the one we were building.

"All of our 12 cabs now in service are being operated 24 hours a day with two drivers; each man working 12 hours. To enable us to operate our electric cabs 24 hours a day we have had installed at the edge of the sidewalk at the Hotels Statler, Tuller, Griswold House, and Pontchartrain charging boxes, and our cabs, while standing idle, are on charge. The Edison Illuminating Company of Detroit has cooperated with us in every way possible, and has given us power wherever it was possible to do so.

"We feel that we have constructed for our service a thoroughly up-to-date, practical electric taxicab. Some eight years' experience with the gasoline car taught us the weak points of the gas car, and we have tried to overcome them with our new construction.

"Our cab has a 121-inch wheel base, and the interior of the cab body proper has a space about 68 inches long and about 50 inches wide, which enables us to carry from four to five passengers very comfortably. Our experience taught us that the limousine type of body was preferable to the landaulet type, and could be operated with less expense. Our operating cost per mile up to the present time has not exceeded 20 cents a mile. This cost includes drivers' wages, overhead, tire expense, garage expense, depreciation and every expense, in fact, which is incidental to the operation of the taxicab business. The only point on which we are uncertain is the life of the car. We feel that the car has been so well made that we may be able to depreciate this car over a period of ten years. This, of course, is a problem which time alone will tell whether or not we are correct."

A view of one of the Detroit cabs is shown in the accompanying illustration. The battery equipment used comprises 59 cells, Edison A-6 battery and a speed of 24 miles per hour can be attained. Each vehicle averages from 75 to 100 miles per day.

Operating Costs of Industrial Electric Trucks.

The accompanying tables gives all labor and operating charges on 212 industrial trucks in the service of the Pennsylvania Railroad, during the year 1914. These data, which were presented by T. V. Buckwalter before the recent convention of the Electric Vehicle Association of America, are arranged in two sections devoted to total charges for all trucks at each installation and averages per truck month for each installation.

There is naturally a wide variation in some of the charges, due to difference in current cost, ranging from 5 mills to 10 cents per kilowatt-hour, to the number of trucks in the installation, and the character of the work performed.

The shop trucks include labor charges of drivers, but the baggage trucks do not include these charges for the reason that the trucks are driven by the baggage porters.

The installations are given an efficiency standing based on saving on shop trucks and on cost of operation on baggage trucks. The former is computed on saving because these trucks handle work formerly done by manual labor, and the saving is readily computed. However, the figures do not represent the total saving, as, for instance, increased efficiency of the shop due to having material handled on a regular and prompt schedule does not admit of calculation. The old practice of helping out the labor gang with machinists is also to a great extent avoided.

The saving effected in baggage service is considerable, and some figures are available but were not considered sufficiently complete to be presented at this time. This saving is difficult of calculation. The character of the service has changed considerable since the introduction of electric trucks. The parcel post, formerly non-existant, is now a large and important part of the work. The labor force has not, generally speaking, been decreased, but on the other hand, the business has increased.

Rush periods can now be handled without borrowing untrained men from other departments. A better class of men continue in service, as compared with the rapidly changing force in the old days.

ELECTRIC TRUCKS—SUMMARY OF OPERATING DATA, YEAR 1914.

SHOP TRUCKS.

Shop	Average monthly data all trucks: No. of trucks	Labor: Driver	Labor: Truck repairs	Labor: Battery repairs and charging	Material: Truck	Material: Battery	Material: Tire	Kilowatt-hours	Current cost	Total cost	Averages per truck month: Total cost	Current cost	Saving	Percentage (See note 2)
Harrisburg	1	48.98	2.62	1.76	1.89	4.40	5.39	209	5.43	70.47	70.47	5.43	154.80	100.0
Verona	1	59.96	5.30	2.74	1.55	1.09	3.48	587	8.81	82.94	82.94	8.81	154.65	99.8
Trenton	1	32.48	5.72	2.84	8.36	1.56	6.35	792	9.90	67.20	67.20	9.90	134. 9	87.0
Juniata	2	76.64	13.23	11.82	5.36	11.42	1.73	1,426	11.14	131.33	65.66	5.57	109.15	70.5
Altoona car shops	3	116.96	12.52	18.26	21.96	12.54	—	1,251	8.57	190.81	63.60	2.85	96.12	62.0
Renovo	2	92.95	2.84	12.35	1.63	8.28	—	1,168	18.05	136.10	68.05	9.02	93.61	60.4
Mt. Carbon	1	32.36	0.39	2.39	0.40	1.13	—	272	8.80	45.47	45.47	8.80	93.22	60.2
Altoona machine shops	9	560.42	88.96	35.89	45.79	13.72	29.77	2,342	14.06	788.61	87.62	1.56	92.22	59.5
Pitcairn	4-5	168.46	44.48	30.24	22.07	22.64	20.81	789	4.05	312.75	67.99	0.88	89.64	57.9
South Pittsburgh	1	42.35	1.83	1.76	0.22	0.51	—	392	4.60	51.27	51.27	4.60	64.04	41.3
Meadows shop	1	—	2.85	1.06	0.74	0.08	—	734	29.40	34.13	34.13	29.40	21.75	14.0
Sunnyside yard	10-14	—	40.89	14.32	22.29	3.21	12.80	4,938	38.86	132.37	12.73	3.74	—	—
West Philadelphia	1	10.27	1.68	0.08	0.01	0.06	—	208	1.44	13.54	13.54	1.44	—	—
Jersey City Pier L	3-5	—	30.10	30.93	22.18	35.05	9.38	1,340	45.77	173.42	51.00	13.46	—	—

BAGGAGE TRUCKS.

Station	Average monthly data all trucks: No. of trucks	Labor: Truck repairs	Labor: Battery repairs and charging	Material: Truck	Material: Battery	Material: Tire	Kilowatt hours	Current cost	Total cost	Averages per truck month: Total cost	Current cost	Saving	Percentage (See note 3)
Baltimore	2	6.54	6.02	1.30	0.62	1.53	953	11.50	27.50	13.75	5.75	—	100.0
Philadelphia	34-35	87.55	96.36	128.52	12.30	8.19	6,821	88.66	421.58	16.93	3.56	—	81.2
Pittsburgh	17-28	158.50	136.98	128.90	40.07	3.43	6,731	34.96	503.13	17.97	1.25	—	76.5
New York	64-66	198.11	172.03	248.73	475.38	23.64	5,016	66.63	1,184.48	18.08	1.02	—	76.1
North Philadelphia	4-10	23.29	33.28	15.09	32.76	6.11	1,534	43.56	154.09	24.85	7.03	—	55.3
Washington	18	90.46	58.17	67.59	37.91	114.72	11,810	85.88	455.00	25.28	4.77	—	54.4
Jersey City	3-5	40.88	17.66	16.24	21.48	—	956	19.12	115.38	29.58	4.90	—	46.5
Harrisburg	1	10.44	4.17	0.96	39.02	—	588	12.01	66.60	66.60	12.01	—	20.6

1. The efficiency standing of each truck installation is indicated on a percentage basis. 2. Shop truck efficiency is based on saving in labor effected. 3. Baggage truck efficiency is based on cost of maintenance per truck month. 4. In each case the best showing is indicated as 100% efficiency.

Why The Electric Truck Finishes Strong

There is so much noise about automobiles in general that the Electric truck suffers to some extent just because it is an Electric—hence quiet and rather unostentatious. Electric delivery expands yearly on the solid economic basis which characterizes the growth of Electric lighting power, traction, etc. In comparison with its more spectacular co-worker, the gasoline truck, the Electric may seem to be slow and to "trail" its betters, but don't forget the finish of the race.

The economic fields of the two types are rapidly becoming recognized. Firms who discarded the early Electrics for gasoline trucks are going back to the modern Electric which has all the economic advantages of a machine electrically propelled, plus far better batteries and other improvements. The great city fleets of our corporations are nearly all Electric and other city fleets soon will be.

The more scientific delivery becomes the more Electrics will be used. The Electric excels in three essentials—*long life* which means low depreciation—*dependability* which means fewer breakdowns and—*economy of operation* which means fewer parts replacements, lower wages for driver, low insurance rates and so on. These things the ledger shows in black and white (sometimes red also) and the firms who heed, credit the Electric at the tape.

With nearly 5000 G.V. Electrics in daily operation we offer you six models representing by far the most substantial progress in Electric road transportation. Let us send you our handsome and instructive catalogue.

General Vehicle Company, Inc.
Long Island City, N.Y.
New York, Chicago, Boston, Philadelphia

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COMPARISONS BETWEEN HORSE, GASOLINE AND ELECTRIC DELIVERY COSTS.

Summary of Electric Vehicle Study by Massachusetts Institute.

The fourth and final paper on the economics of motor trucking vs. horse-drawn haulage, summarizing the results of an extensive investigation covering three years, has been issued by its author, Harry F. Thomson, late of the Electrical Engineering Research Division, Massachusetts Institute of Technology, Boston. The investigation was suggested by Charles L. Edgar, president of the Boston Edison Company, and financed by this company. Bulletin I, issued in March, 1912, dealt with "The Economical Transportation of Merchandise in Metropolitan Districts;" Bulletin II, with the "Cost of Motor Trucking," and III embraced "Observations on Horse and Motor Trucking." The first two publications are out of print, but were reviewed to some extent in THE ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, at the time of issue.

The current bulletin discusses (1) delivery and trucking conditions in large American cities, (2) reviews important data collected during the study, and (3) presents estimates of relative expenses of performing various classes of delivery work by the three agencies.

Under the head of "City Hauling Condition," Mr. Thomson points out that the average daily travel of a horse is about 15 miles at four miles an hour. This means that he is actually moving 3.75 hours and standing 6.25 hours of each 10-hour day.

Thus, the prevailing arrangements at freight houses, warehouses and yards are such as to favor horse operation, in that the waiting periods correspond to the amount of time required by nature for rest.

The coming of the motor truck has shown the entire inadequacy of railroad and warehouse arrangements for loading and unloading. The conditions which make motor operation more efficient than horses for this class of service are lacking at present, but should be given attention by transportation experts. With more doors, better assorting of goods to be hauled and the use of detachable bodies, transportation by motor will be greatly facilitated. To illustrate the handicap put upon efficient haulage, observations were taken of 179 loads, which were hauled from a factory, the average wait for turn at the loading platform being 34 minutes, while it required only 17 minutes to load.

Suggestions offered for the more successful operation of motor trucks are:

(1) Cars should be routed so as to avoid idle standing time and unnecessary retracing of route.

(2) Motor trucks should be kept moving; they represent greater investment, and earning power, than horses.

(3) Cars should be inspected weekly and a written report made to the superintendent.

(4) Cars should be overhauled at least yearly.

(5) Overspeeding and overloading should be prohibited.

(6) Drivers should be interested in the condition of their cars; each should have his own machine, if possible.

(7) Accurate records of cost and performances should be kept; this will stimulate the driver, and be valuable as a basis for discussion with manufacturers.

The daily performance of 63 vehicles in trucking and delivery service was observed for eight months. A tape record of distances and speeds was obtained, and data collected on stops, loads, etc. Cost data was obtained from 32 companies operating 780 electrics, 41 operating 401 gasoline, and 54 operating 5,787 horses. Maintenance expense, the relative merits of Edison versus lead batteries, and of solid versus pneumatic tires, and the consumption of "fuel" or feed, were examined carefully.

Some of the results arrived at were:

The reliability of electric trucks is about 95 per cent of working days (290 days out of a possible 305), while gasoline trucks show about 90 per cent reliability, or 275 days a year.

For parcel delivery, the cost per delivery was estimated as follows, in cents per package:

COMPARATIVE COSTS PER PACKAGE.

Zone.	One-Horse.	Gasoline 1,000-Pound Car. Gasoline at 12 Cents.	Electric 1,000-Pound Car. Electricity at 2 Cents.
Within 2 miles..	5.8	6.4	5.75
Within 4 miles..	6	6.4	5.75
Within 10 miles..	7.75	7.9	7.15
Within 13 miles..	12	10	...

The two-mile zone represented three trips a day from the store; the four-mile zone, two trips, and the outer zone one trip. The conclusion was drawn that the economic zone for horse delivery is within a two-mile radius, for electric cars between 2 and 10 miles, and for gasoline cars beyond 10 miles. This corresponds roughly with the present layout of delivery systems of some large New York department stores.

Estimates for bulk-goods delivery, such as coal, stone and lumber, show that for hauls of two miles or less the cost by horse wagon is cheapest; for hauls between two and six miles, the electric truck is cheaper than either horse wagon or gasoline truck, and for hauls of more than three miles the gasoline truck is cheaper than the horse wagon, but not so cheap as the electric, at least within the six-mile radius. Delivery costs per load, comparing two-horse truck up to two-mile haul, and three-horse truck for greater distance, with five-ton electric and five-ton gasoline trucks, were as follows:

COMPARATIVE COSTS PER LOAD.

Vehicle.	1 Mile.	2 Miles.	4 Miles.	6 Miles.
Horse-drawn truck	$1.00	$2.00	$3.90	$6.00
Gasoline truck	1.50	2.50	3.70	4.62
Electric truck	1.25	2.05	3.15	4.25

As in the table on parcel delivery, gasoline at 12 cents and electricity at two cents is assumed.

The author of the bulletin points out that the cost of "fuel," i. e., gasoline or electricity, bears a small relation to total operating costs. For reasonable distances traveled, and for gasoline at 16 cents or electric current at three cents, the cost of fuel is only 6 to 10 per cent of the total operating cost. Labor is a large item. In parcel delivery, the expense for driver and helper ranges from 36 per cent of the total, for the long-haul gasoline car, to 63 per cent for the short-haul horse wagon, with labor expense for electrics midway of the two.

Conclusions as to the economical zones of operation are: For both light and heavy service, the electric truck can operate within a zone of short haul, covering dense territory, at about the same unit delivery cost as for horse wagons; for longer runs, within mileage limits practicable with a single battery charge, the electric is cheaper than either competitor; while for runs beyond the convenient daily capacity of a storage battery, the gasoline truck is the most practicable.

These zones, as already indicated, are roughly, two, 6 to 10, and more than 10 miles, respectively, from the center of operation. "Representative values of the difference in delivery costs in favor of the electric over the gasoline machine in the medium-haul zone," says Mr. Thomson, "range from 8 to 20 per cent, and over the horse wagon as high as 30 per cent, with the horse entirely eliminated, in some classes of service, because of physical limitations."

The field of economic operation of the electric may be extended by recharging facilities at desirable points and by the use of a second set of batteries for a truck which is to cover a greater daily mileage than a single charge will permit. Either of these methods may increase the effective radius of the electric so as to make its unit delivery cost lower than that of the gasoline machine, for the longer runs.

Mr. Thomson points out that there are other considerations besides cheap-

A Letter from Ensign Fitzhugh Green of the U. S. Navy Relating Some of His North Polar Experiences

Here are a couple of paragraphs of a most interesting letter written by Ensign Fitzhugh Green, U. S. N., a member of the Crocker Land Expedition, which is on an exploration trip in the North Polar Regions. This letter, written from Etah, Greenland, the headquarters of the expedition, and dated August 1st, 1914, only recently reached us.

One Paragraph Reads:—

"Our wireless has failed so far, due principally to the unfortunate position of our headquarters. We were unable to locate in Flagler Fiord owing to the heavy ice. The papers will have an account of our work to date, as McMillan is sending in a dispatch by this mail."

Another Paragraph Says:—

"At Etah we were forced to land over the ice and rocks. Putting up the house required nearly three weeks and the motor generator meant another week's delay before we finally got at the batteries early in October. Filling the jars and giving the whole a good overcharge, we switched over to our lights which we had wired throughout the house. There was a blaze of light. The Esquimos gathered for the occasion were wild with delight. It was great!"

The battery referred to in the above paragraphs was an "Ironclad-Exide" If ever a battery saw hard service, rough usage and had to operate under the most unfavorable conditions, this was it. Such a test proved without doubt the reliability of the "Ironclad-Exide" Battery.

We have had facsimile copies made of the entire letter of which the above paragraphs are only a part. The letter contains many interesting facts and incidents. We will be glad to send you a copy on request.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator", The "Tudor Accumulator"
The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

New York Boston Chicago Washington **PHILADELPHIA, PA.** Denver San Francisco Seattle St. Louis
Cleveland Atlanta Pittsburgh Detroit **1888-1915** Rochester Los Angeles Toronto

ness—reliability, appearance, rapidity of deliveries, cleanliness and advertising value of electric service. The time may come when the use of horses will be forbidden in the largest cities, thus removing cause of filth, flies and disease.

Under "Prospect for the Future," the investigator remarks that while the use of horses has reached a highly developed state, after generations of application, the habits of truck users have not adjusted themselves to the most efficient application of the machines. Improvements in construction and in the conditions surrounding their operation will result in increasing superiority.

Electric Vehicles in Concord.

The town of Concord, Mass., which operates a municipal lighting plant, has 60 miles of street lighting. This includes every public road in the town. The uniform lighting unit is the 50-watt incandescent, and there are about 1,000 of these lamps, with simple metal reflectors.

The efficiency of electric vehicles in operating the plant has been fully demonstrated. Manager A. W. Lee says they are practically indispensable. The plant owns a Bailey electric roadster which is used for patrolling, and a one-ton G. M. C. truck for all highway work. The latter gets hard service, being on the road all day, every day in the year, with scarcely time to allow its being painted. With the use of this vehicle four men are able to perform all the line work, including new construction and renewals. Just at present the gang is engaged, during available time, in the concrete reinforcing of poles. About 200 have been reinforced thus far, by the Orr system. Poles which are approaching the end of their usefulness are excavated about, the decayed portion removed, and forms set in place which are filled with concrete, making a base about 15 inches in diameter and extending 8 or 10 inches above ground level.

Garage Topics Discussed by Chicago Vehicle Men.

The functions of an electric vehicle garage, caring for either passenger or commercial cars, were discussed at the meeting of the Chicago Section, Electric Vehicle Association of America, on November 2. R. Macrae, of the Commonwealth Edison Company, led in the discussion, abstracting his paper on this subject presented at the recent Cleveland convention of the Association. He pointed out the poor load-factor of private charging stations, and the lack of facilities for giving the battery and vehicle the care it requires. He concludes that "in order to get the best that is in the electric vehicles out of them we must operate them from large and properly equipped garages."

Comparative Development of the Commercial-Power and Electric-Vehicle Loads.

The prevailing impression that the progress of the electric commercial vehicle propaganda is slow is justified only as it relates to those cities where endeavor in this direction has been discouraged or where no attempt to introduce these machines has been made at all; for, as a matter of fact, wherever any systematic endeavor to promote the use of electric vehicles has been made, not only has progress resulted, but that progress has been relatively as rapid as have similar gains in other fields of electricity merchandising.

To prove this statement H. H. Holding and Stephen G. Thompson presented some interesting data before the Electric Vehicle Association of America, selecting for comparison the records of three years' development of the commercial-power and electric-vehicle loads in Public Service Electric Company's territory in New Jersey, during which period similar systematic exploitation of these two fields of electricity selling was employed. These three years are selected because they represent a period in which business conditions were nearly normal and free from the industrial disturbances which have occurred since 1913.

From these records charts shown in

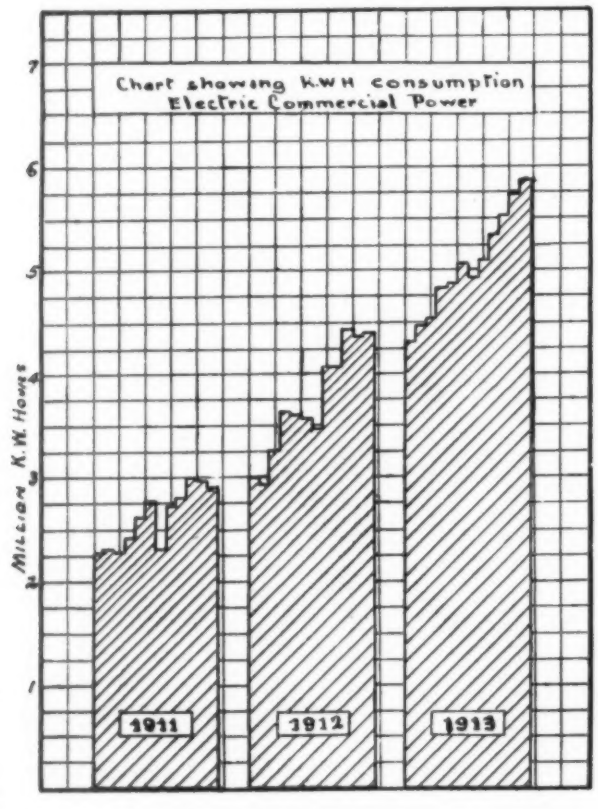

Fig. 1.—Commercial Power Consumption in New Jersey.

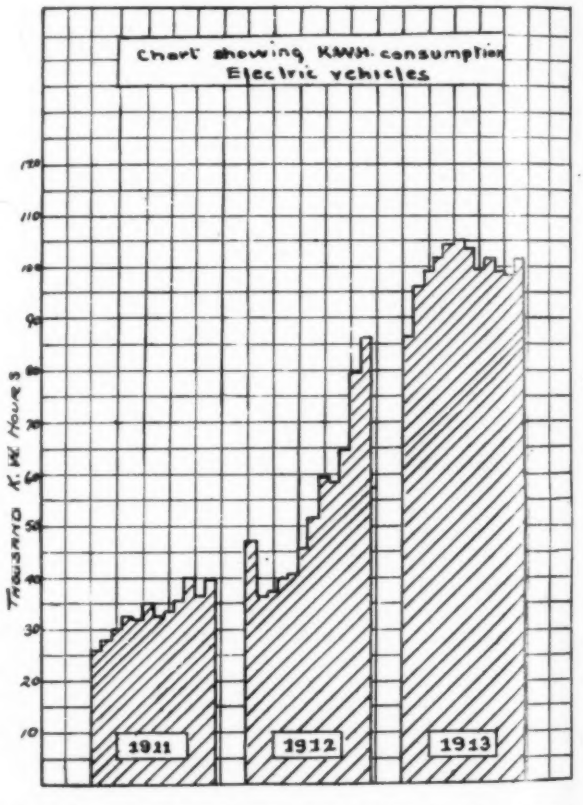

Fig. 2.—Battery Charging Energy Consumption in New Jersey.

A Striking Testimonial to the High Service Efficiency of Edison Alkaline Storage Batteries

December 17, 1914.

Edison Storage Battery Co.,
Orange,
New Jersey.

J. Kelly, Branch Manager.

Dear Sir:

In answer to your inquiry of December 16th as to the life of the Edison A-6 Storage Batteries in our Delivery service, I am pleased to inform you that the eighteen A-6 Batteries which we put in service in 1909-10 under a guaranteed life of three years, have given from four years to four years and six months continuous service, in every case.

This means every working day at an average mileage of thirty-five miles per day. As these batteries exceeded their guaranteed life by such a large margin, I feel you are entitled to this information from.

Thos. Brennan

B/M Chief Engineer.

Four and one-half years' continuous service, *"every working day"*—no expensive repairs; no lost time; no disarranged delivery schedules.

The Edison non-acid, steel-encased, nickel-iron Storage Battery is used in over one-third of all the Electric Trucks and Delivery Wagons in the country.

Write for Bulletin 500 on Commercial Vehicle Batteries.

EDISON STORAGE BATTERY COMPANY

Factory and Main Office, Orange, New Jersey

Distributors in

New York Boston Chicago Detroit Washington
San Francisco Los Angeles Portland, Ore. Seattle

Figs. 1 and 2 have been plotted, in which the kilowatt-hour consumption for the years 1911, 1912, and 1913, for both power and electric vehicles are comparatively shown.

In considering these charts, due allowance for the different scales used must be made, otherwise they will be misleading, as the areas shown are not comparable at all in the relation of vehicle to power load, but only in their relation to one another in the same chart. In fact, the purpose of the charts is to show the increase in kilowatt-hour consumption in each field and to compare this growth in substantiation of the statement that the electric-vehicle load has developed as rapidly as has the power load in the same period. Therefore, a proper use of the charts would be a comparison of the power load consumption for 1911 and 1913 and of the electric-vehicle load for the same period, which will indicate that the relative increase in business in the two fields has been in the neighborhood of 100 per cent for the power load and 200 per cent for the vehicle load. This more rapid development of the electric-vehicle load is probably due to its relative size as compared with the total power load, and therefore the percentage relations are not parallel; still it is noticeable that the curve of increase follows the same general line, as indicated by the upper portion of the plotting.

During the three years covered by the charts a relative amount of effort was expended in each field of electricity selling, that is, the effort was made commensurate with the gross amount of business already developed and the probable increase in each field.

With these and similar evidence from other localities, it is rather surprising that the prevailing adverse attitude toward the electric machine should be found so generally existing in the ranks of those most interested in the ultimate gain of the goal indicated by the slogan of the central-station interests, "Do it Electrically." The fact that this attitude actually exists at all is probably due to error in the selection of the reference point when comparing the electric-vehicle development with that in other lines. All values in life are relative, whether there is rest or motion, depending upon the location of the reference point, the proper selection of which will place the electric vehicle in an entirely different light and indicate that it presents a potential field for the sale of electricity comparable with the present commercial power field.

Heretofore the reference point which seems to have been universally used in determining the progress of the use of the commercial car electrically driven, is the commercial car gasoline driven. This conception is entirely wrong.

That the electric motor in the factory is displacing other forms of power transmission, no one can deny. Let us see what has been the rate of progress of electric power transmission in the factory. Turning to the United States census reports we discover that in the ten years from 1899 to 1909 the manufacturing industries of the country increased their product 83 per cent in value. To produce this added output over eight million horsepower was added to the power used in the factories. Of this amount two million horsepower was in electric motors, the remaining six million being in other forms of transmission, mostly steam engines with belt drive.

During that entire decade the electric motor was a demonstrated commercial success, yet by no means was it able to monopolize the market for power transmission in the factory.

Census figures further show that in five years from 1899 to 1904 the increase in electric drive was but 7.1 per cent, while in the five years from 1909 to 1914 the increase was 21 per cent.

If we use the history of the popularity of the electric motor in the factory for reference, the rate of adoption of the same motive power for the transportation of the product of the factory is in comparison highly complimentary to the latter.

The change of conditions in this country has created a large demand for vehicular transportation of merchandise, and the demand has been partially met by the use of the most accessible substitute for the horse, namely, the gasoline vehicle. That such a vehicle is the "best" does not follow as a conclusion more logically than did the use of steam with belt transmission indicate the superiority of such transmission in the decade referred to above.

As the central station has been an accelerating factor in the promotion of the use of the motor for industrial power transmission, so even in a greater degree its influence through its sales organization will prove to be a mighty power in bringing into "its own" the electric commercial vehicle.

Electrical Manufacturer Builds Garage for Employees.

In line with the modern tendency in manufacturing establishments to provide every possible convenience and comfort for employees, the Robbins & Myers Company has recently completed a garage to house the cars of the employees at its large motor and dynamo factory, Springfield, Ohio.

Exterior of Employees' Garage at Robbins & Myers' Plant.

Interior of Garage—Battery Charging Facilities Are Provided.

The building is of brick and steel construction. The brick is stuccoed, giving a very attractive appearance to the exterior of the building. The floor and also a large driveway extending the entire length of the front of the building are concreted. Daylight illumination is obtained both from windows in the side walls and from skylights. Night illumination is obtained by high-wattage Mazda lamps with metal reflectors.

The building is 84 by 64 feet and will house between 30 and 40 cars around the walls without using any of the space at the center of the floor, enabling every car to run in or out without moving any other car. The floor is marked off and each employee who drives a car has been assigned a position which belongs to him permanently, thus avoiding any confusion among the drivers as they enter.